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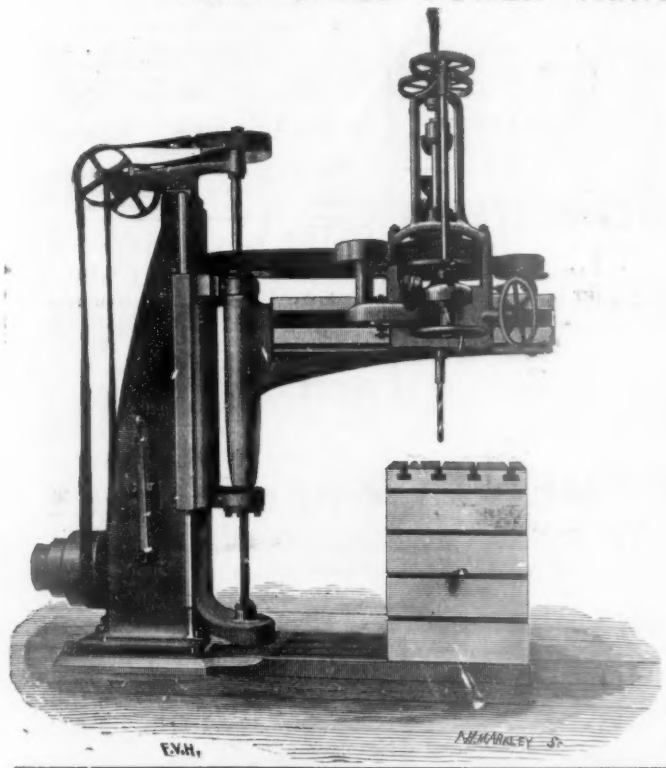

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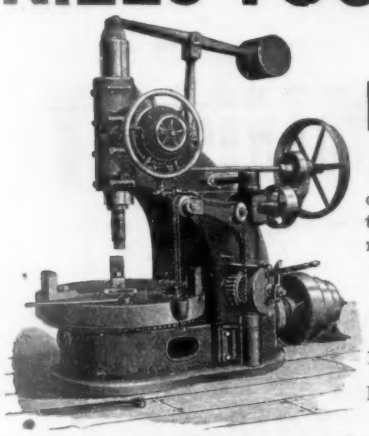

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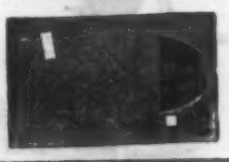

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N. J. Car Storage & Repair Co. 1
New Jersey St. & Ir. Co. 39
N. Y. Air Brake Co. 4
N. Y. Belting & Packing Co., Ltd. 21
N. Y. Car Wheel Wks. 40
N. Y. C. & H. R. R. R. 33
N. Y. Equipment Co 1
N. Y., L. E. & W. Ry. 33
N. Y. Railway Supply Co. 13
N. Y. & New England R. R. 33
Niles Tool Works. 2
Northampton Emery Wheel Co. 2
Northw'n Equipment Co. 40
Okonite Co. 18
Osgood Dredge Co. 10
Paine, Chas. & Sons 12
Pardee Car & Machine Co. 27
Parsons, W. B 1
Passaic Rolling Mill Co. 36
Pedrick & Ayer 9
Peerless Rubber Co. 6
Pennsylvania R. R. 33
Pennsylvania Steel Co., N. Y. 1
Pennsylvania Steel Co., Pa. 40
Perry Ventilator Co. 27
Peters, G. D., & Co. 1
Philadelphia Bridge Wks. 38
Phila. Engineer. Wks., Ltd.
Phoenix Bridge Co. 37
Phosph. Br'ze Smelt. Co., Ltd. 28
Pickering Spring Co. 31
Pittsburgh Bridge Co. 37
Pittsburgh Forge & Iron Co. 34
Pittsburgh Loco. & Car W'ks. 35
Pittsburgh Reduction Co. 23
Pittsburgh Testing Laboratory. 1
Place, Geo.
Poage, John S. 16
Porter, H. K., & Co. 34
Pottsville Bridge Co. 37
Pratt & Letchworth 40
Prindle & Co., H. B. 13
Prosser, Thos., & Son 30, 35
Queen & Co. 13
C. & C. Co. 22
Railroad Lighting & Mfg. Co. 24
Ramapo Iron Wks. 32
Ramapo Wheel & F. Co. 30
Rand Drill Co. 17
Reed, Frank
Reeves, Paul S.
Rendrock Powder Co. 17
Rensselaer Polytechnic Inst. 5
Rhode Island Tool Co. 34
Richmond Loco. & M. Wks. 35
Roberts, A. & P., & Co. 37
Robinson & Orr 13
Roch. Bridge & Iron Wks. 39
Rogers Loco. & Mach. Wks. 35
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Royal Ins. Co. 16
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St. Louis Car Coupler Co. 26
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Schuttler Mfg. Co. 31
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Sellers, Wm. & Co. 2
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Sharon Steel Casting Co. 40
Sheffield Velocipede Car Co. 40
Shiffler Bridge Co 37
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Shoenberger & Co. 31
Shoulder Tie Plate Co. 5
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Smillie Coupler & Mfg. Co. 29
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Smith, F. H. 13
Solid Steel Co. 9
Sooysmith & Co. 39
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Souther, Jno., & Co. 17
Southern & Pac. Refrig. Car Co. 26
Spon, E. & F. N., & Co.
Sprague, Duncan & Hutchinson. 22
Springfield Iron Co. 13
Standard Car Coup Co. 29
Standard Nut Lock Co. 34
Standard Paint Co. 37
Standard Steel Works. 30
Standard Thermometer Co. 34
Stiles & Parker Press Co. 9
Stonington Line. 39
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Stow Mfg Co. 21
Tuite & Carlton. 38
Tanite Co. 40
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Thomson-Houston Motor Co. 3
Thomson, J. L., Mfg. Co. 6
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Trenton Iron Co. 21
Trojan Car Coupler Co. 28
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Union Iron Works. 5
Union Switch & Signal Co. 1
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Universal Radial Drill Co
Valle & Young 13
Van Dorston Cushioned Car Coup. Equip. Co. 28
Von Schon & Garner 13
Vulcan Iron Works (Chicago) 17
Waddell, J. A. L. 13
Wallis Iron Works. 39
Wants and For Sale 13
Washburn Car Wheel Co. 30
Wason Mfg. Co. 26
Watson & Stillman 8
Wehn Pavement Co. 32
Weir, Fred C.
Westinghouse Air Brake Co 23
Wharton R. R. Switch Co. 34
White, Jno. A., Co. 5
Whitney, A., & Sons 2
Whiton, A. S. 1
Whittlesey, Geo. P. 1
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Williams, White & Co. 15
Wilson Bros. & Co. 1
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Wood, R. D., & Co. 22
Worthington, Henry R. 9
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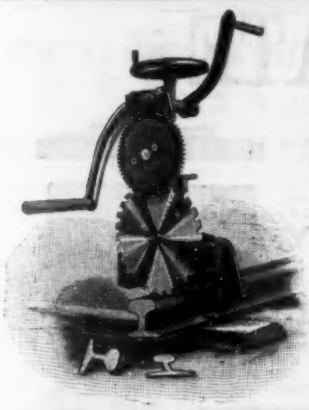

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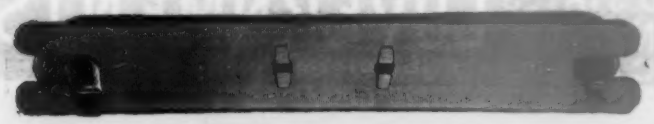

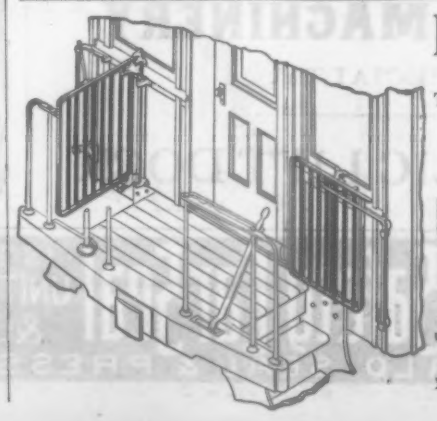

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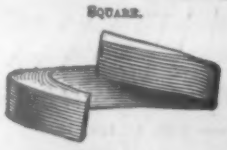

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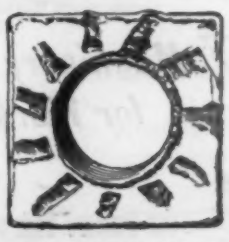

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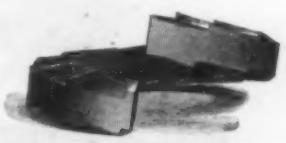

Our claim for this lock, aside from the unexcelled spring quality it possesses (being tempered in oil) is the tangential cutting or ratchet ribs on either side, and reversed, so that when the nut is set down these ribs are embedded in both fish plate and under face of nut to such extent that a removal of the nut by force (and it can only be done with force) will show annular grooves plowed on surface of both nut and fish plate (see cuts above) without disturbing the thread of either nut or bolt, both of which, together with the nut lock, can be used again.
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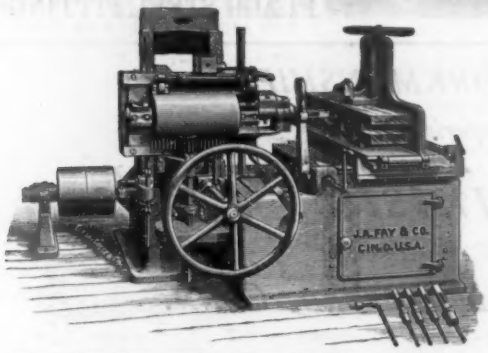

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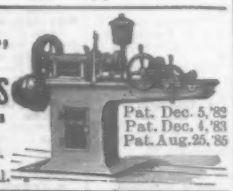

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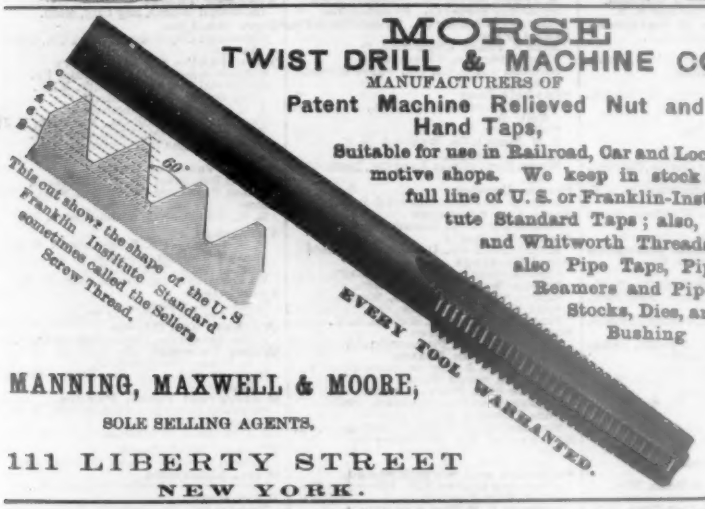
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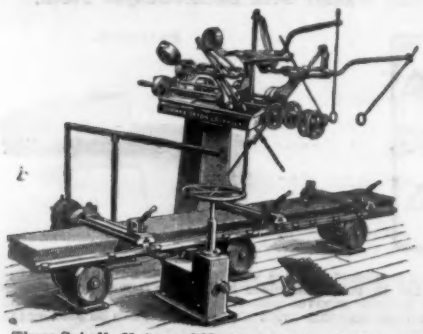

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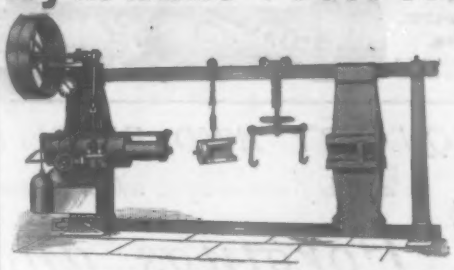

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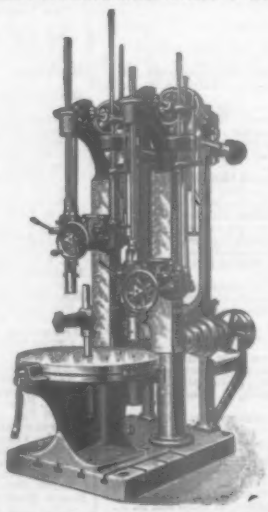

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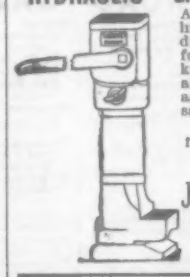

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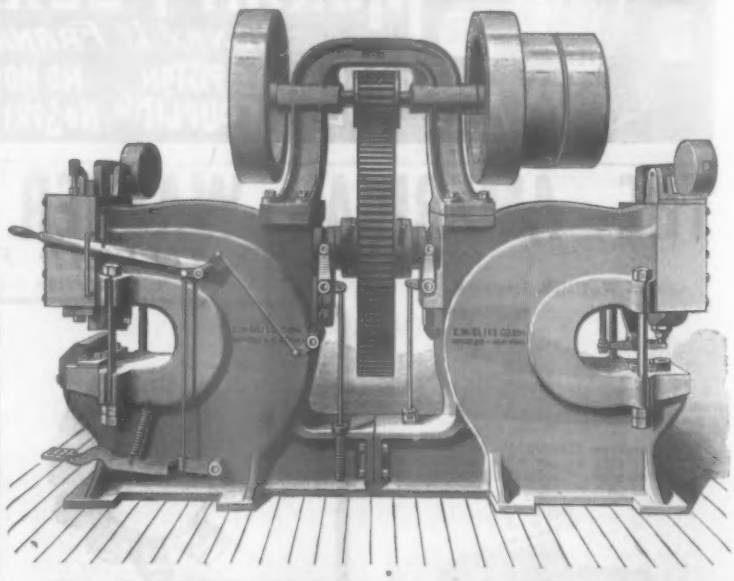

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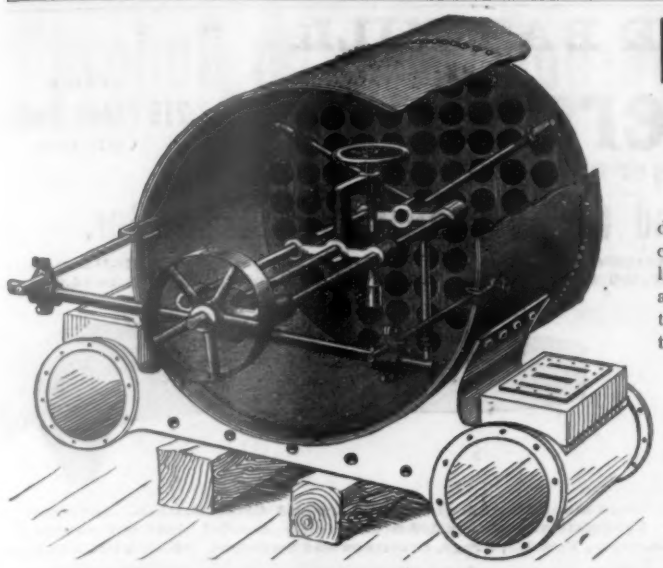

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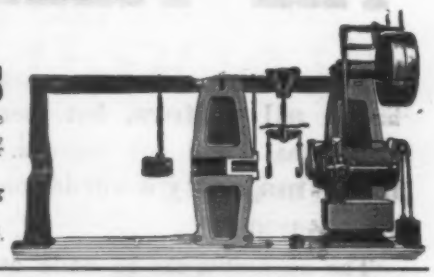

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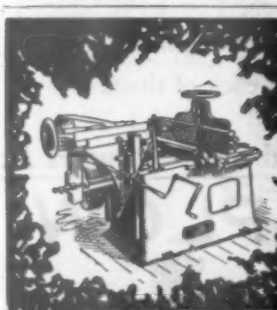

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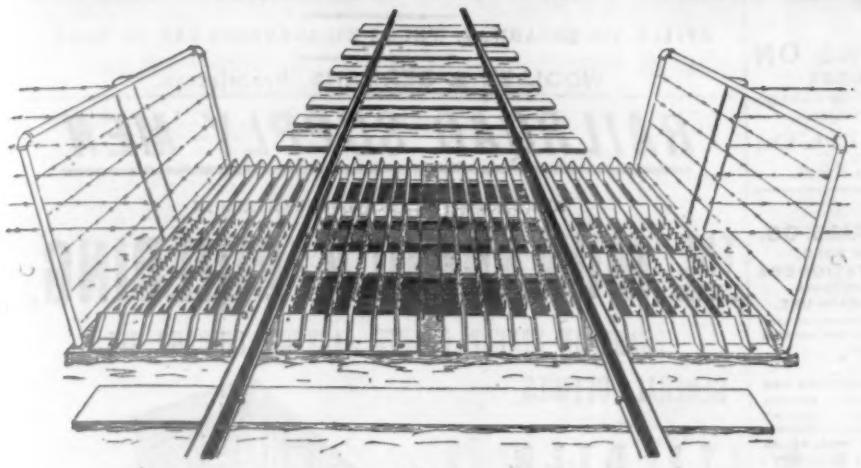

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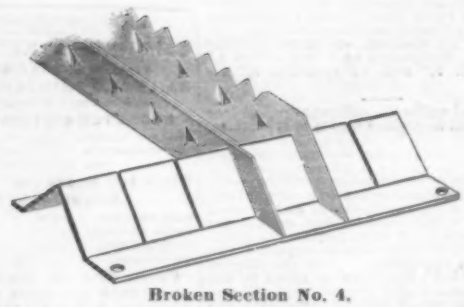

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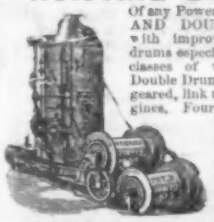

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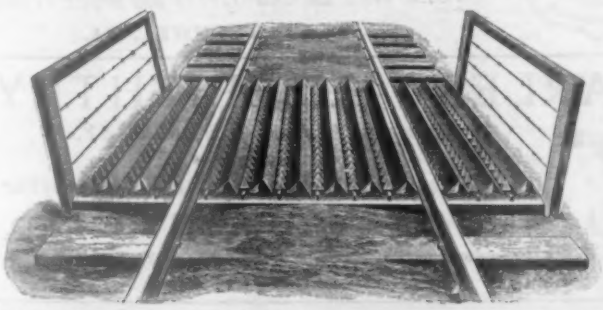

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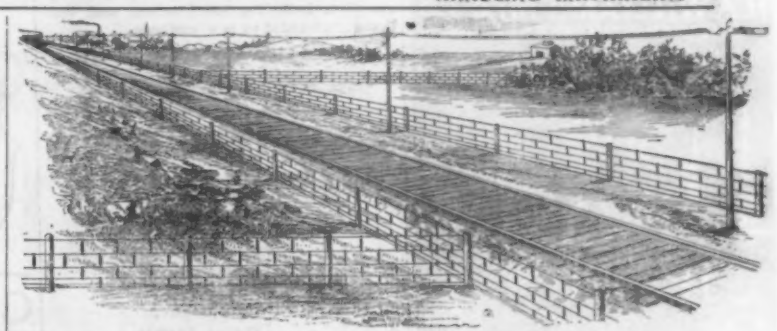

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THE SANITARY DISTRICT OF CHICAGO.

TO CONTRACTORS.

Sealed proposals addressed to the Board of Trustees of the Sanitary District of Chicago and indorsed:

PROPOSALS FOR EXCAVATING THE MAIN DRAINAGE CHANNEL will be received by the clerk of the said Sanitary District at Room H Rialto Building, Chicago, Ill., until 12 m. (standard time) of Wednesday, the 8th day of June, 1892, and will be publicly opened by the said Board of Trustees at the regular meeting held that day, or at a special meeting called for that purpose.

The work for which the said tenders are invited is the excavation of the main drainage channel for the said Sanitary District between Willow Springs and Joliet, Ill., and consists in all of about 11,500,000 cubic yards of rock, of about 5,000,000 cubic yards of earth, the building of 287,241 cubic yards of dry rubble walls, and 244,444 square yards of slope paving.

Bids will be received on three different propositions, designated as "Proposition 1," "Proposition 2," and "Proposition 3," respectively.

As provided under the different propositions said work will be divided into 14 to 17 sections, each of which will be treated as a separate contract in canvassing the proposals and making awards, except as otherwise provided in Proposition 3. As all awards will be made by individual sections or a group of sections, as provided in the specifications and forms of proposals to be furnished bidders, each bidder must make prices for each section, or a group of sections, as the case may be, separate and distinct from every other. The jumping of prices in any bid other than as given in the form of proposal under Proposition 3 will render such bid informal and will cause its rejection by the said Board of Trustees.

As the question of which proposition will be acted upon will not be determined by the Board of Trustees until after the time set for receiving proposals the bidder is allowed to make three alternative tenders based upon the terms of the specification for each of the three propositions respectively.

Each proposal must be accompanied by a certified check or cash to an amount equal to $3,000 multiplied by the number of sections bid upon, whether said sections stand singly or in a group. Provided, that the said check or cash shall entitle the bidder to make tender under any or all three of the said propositions.

All certified checks must be drawn on some responsible bank doing business in the city of Chicago and be made payable to the order of the Clerk of the Sanitary District of Chicago. Said amount of $3,000 for each section will be held by the Sanitary District until all of said proposals have been canvassed and contracts awarded and signed, the return of said check or cash being conditioned upon any bidder to whom an award of any portion of said work may be made appearing within 10 days after notice of such award being given, with bondsmen, and executing a contract with the Sanitary District for the section or sections of said work so awarded, and giving a bond satisfactory to the said Board of Trustees for the fulfillment of the same in the amount of $100,000 for each section of work awarded him, whether said sections be awarded singly or in a group.

All proposals must be made on blank forms furnished by the Sanitary District and must give the price for each separate item of work. A form will be furnished for each of the three propositions.

The bids will be compared on the basis of the engineer's approximate estimate of quantities, which will be furnished with copies of the specifications.

No proposal will be considered unless the party making it shall furnish evidence satisfactory to the Board of Trustees of his ability to do the work, and that he has the necessary pecuniary resources to fulfill the conditions of the contract, provided such contract shall be awarded him.

Bidders are required to state in their proposals their individual names and places of residence in full.

Specifications may be had and plans may be seen at the office of the Chief Engineer, Room E Rialto Building, Chicago, Ill.

The said Board of Trustees reserve the right to reject any and all bids.

THE SANITARY DISTRICT OF CHICAGO,
By FRANK WENTER,
President of Its Board of Trustees.

Attest:
THOMAS F. JUDGE, Clerk.
Chicago, Ill., April 7, 1892.

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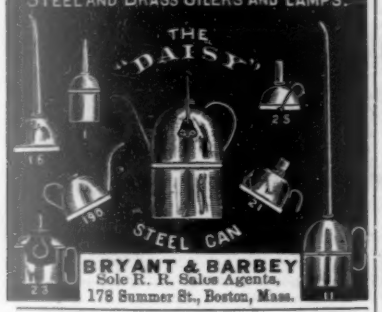

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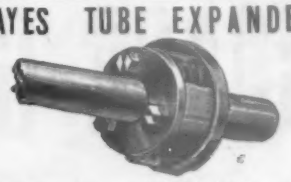

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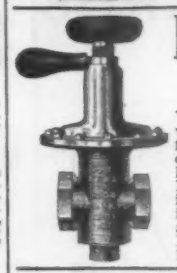

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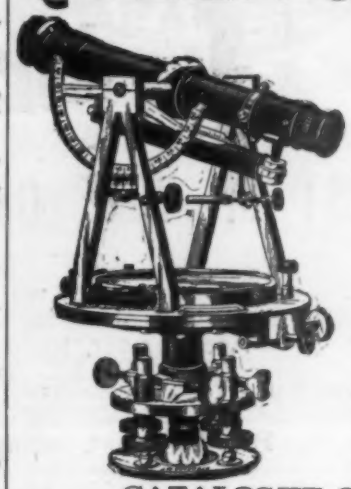
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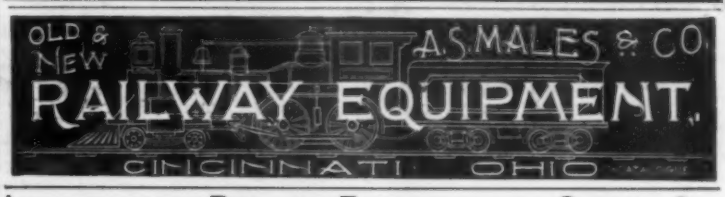

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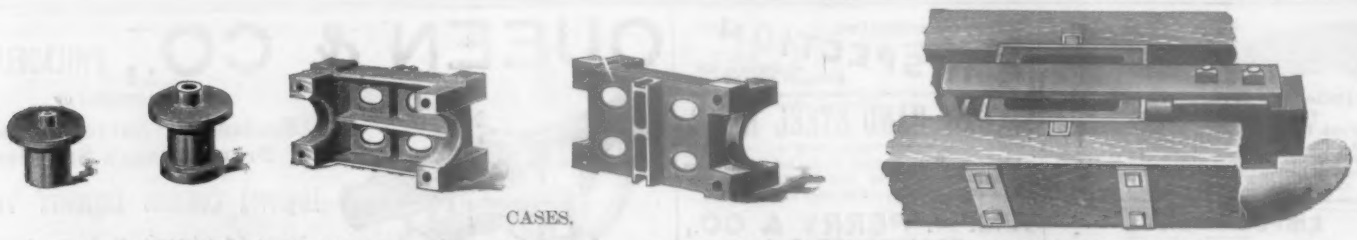

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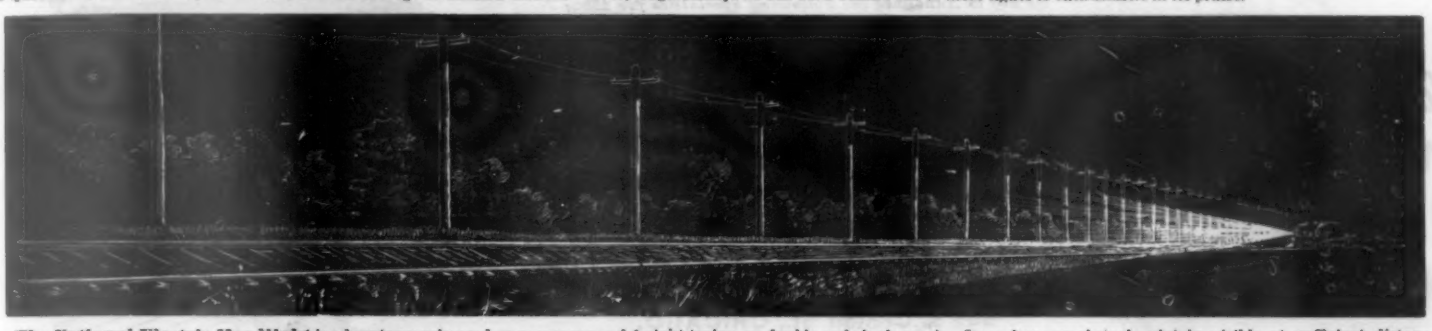

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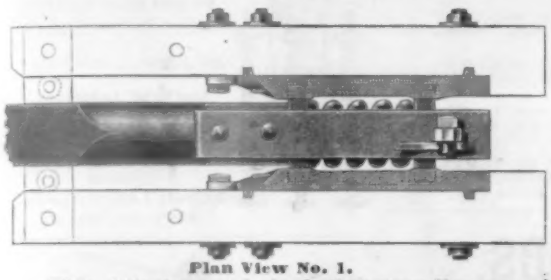

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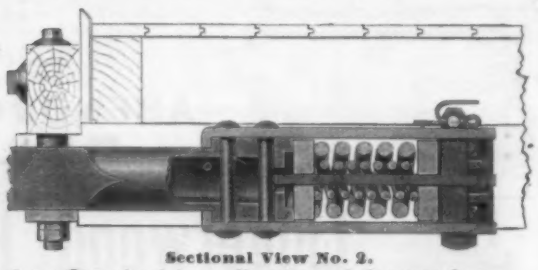

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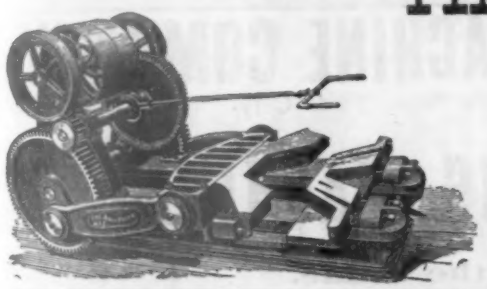

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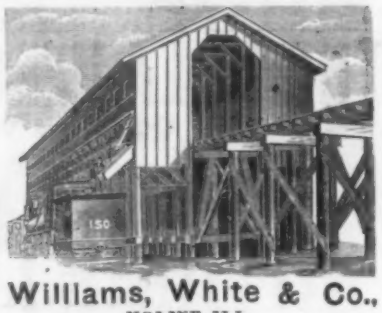

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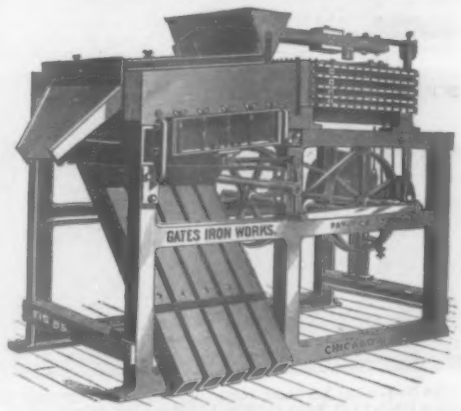

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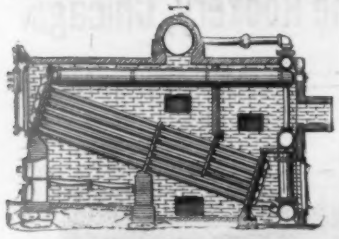

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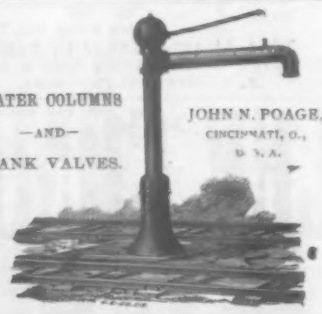

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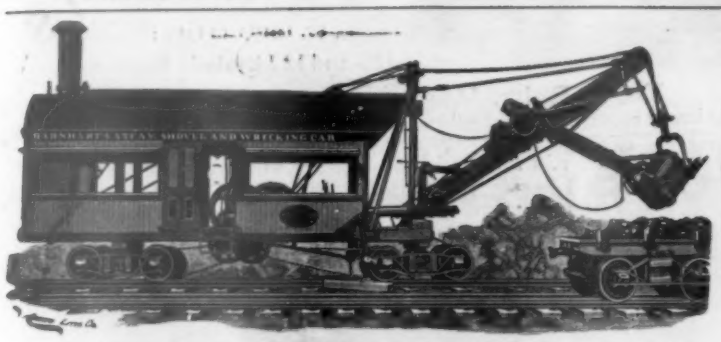

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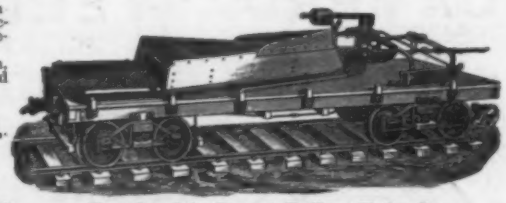

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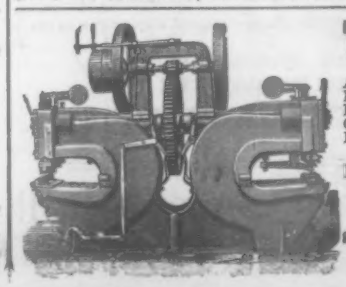

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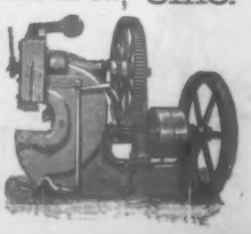

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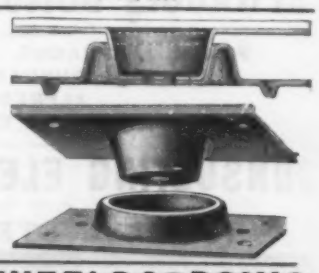

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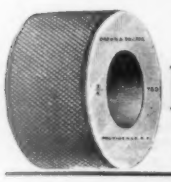

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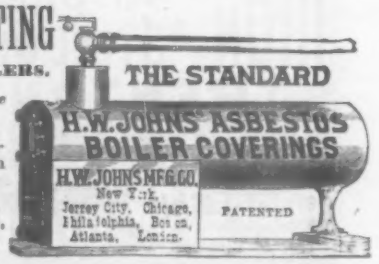

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RAILROAD GAZETTE

FRIDAY, APRIL 15.

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Contributions.

The Frost Dry Carburetor.

PHILADELPHIA, April 8, 1892.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Through some unaccountable sources the impression has gone abroad that the car on the New York, Lake Erie & Western road which was destroyed by explosion and fire on the night of March 30, at New Portage, O., was equipped with the Frost dry carbureter system of lighting. This is not so, as the Erie road uses the Pintsch compressed oil gas system. Such a thing as an explosion with the Frost dry carburetor system has never been known, as it is an impossibility for such an accident to occur.

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[The official report of this explosion was published in the *Railroad Gazette*, April 8, and, as there stated, it was due to an opening or rupture of the pipe and the presence in the compartment of an oil lamp.—EDITOR.]

The Danger in Using White Lights for Signals.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I am anxious to bring to your notice a proposition for a rather radical change in the present system of night train signaling; for while I approve in general the system recommended by the Time Convention and so thoroughly exemplified on the Pennsylvania road, I think there is one serious objection to it, in the use of an easily mistaken signal for a "safety" signal. In other words, I object to the use of a white light for "safety" in a semaphore signaling practice. Briefly my objections to this are: *First*, that the white light is easily confused with other white lights, lights in houses and the like, especially in large towns and cities where the tracks are not straight or where there is a complicated net work of side tracks and cross overs. *Second*, the breaking of a spectacle in a semaphore either maliciously or accidentally, may exhibit a white light when a danger or cautionary signal is intended.

These same objections to the use of white lights for the "safety" signal have, I know, occurred to other railroad men, but the question has arisen in the minds of many as to what colors should be used for danger, caution and safety, if the plain white light is discarded. The answer to this may not be so difficult as is generally thought. There seems no reason at any rate for changing the "danger" signal; it seems well chosen and thoroughly understood and if, as is already the practice on a few roads in this country and I think also abroad, green is used for the "safety" signal, it remains only to choose what shall be the color for the "cautionary" signal. I am inclined to hold that if any of the three signals must be plain white, if would be better to use white for the "cautionary" signal, inasmuch as that signal is less used than the positive danger or the positive safety signal; but I think either blue or violet, now used for back sights on semaphore signals, could be well used for caution signals. The objection to it has been made that it can not be seen as far as other colors, but it is of less importance to see a cautionary signal at a great distance than to see either the safety or the danger signal. If this change is adopted there would be no objection to using the plain white lens for back sights or tell tale.

The rules of the General Time Convention form in themselves one of the strongest arguments in favor of this system of signaling, as they distinctly lay down the principle that the signal for "safety" is quite as important as the signal for "danger" or "caution" and that the absence of a signal is a signal for "danger." No one will deny, I think, that a plain white light is as positive a signal as a colored light, nor that some other light, having nothing to do with the signal, may be often mistaken for it.

A good deal more might be said on this subject, but I think I have said enough to indicate my idea, and I should like to hear your views on the subject, or see it submitted to a general discussion. The true principle of all signaling should combine the greatest simplicity without possibility of confusion. To appreciate the difficulties involved a man should put himself in the position of an engineer. S. F. T.

Extended Smokeboxes on Compound Locomotives.

PITTSBURGH, April 6, 1892.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The communication of Mr. S. M. Vauclain in your issue of April 1, as to the employment of an extended smoke box on Baldwin compound engine No. 385, of the Central Railroad of New Jersey, I understand to be the expression not merely of his personal views on the subject, but also of those of his firm, since it is signed by him in his official capacity. In either regard, the theory which he enunciates is entitled to attention; but notwithstanding its undoubted ingenuity and comparative novelty, it leaves unanswered the essentials of the inquiry and criticism made in my communication in your issue of February 26, and indorsed in that of "C. M. H.," March 18.

Briefly stated, the contention of the two latter communications was that the claimed function and advantage of a smokebox extension was (1) to provide space for a spark arresting netting, and (2) a receptacle for cinders; that by reason of the light exhaust of the compound engine, and its consequent ability to retain its fuel in the firebox until consumed, the extension was superfluous, and that, therefore, its use involves undue cost and weight on truck.

It is clear that as to the above, Mr. Vauclain's reply wholly begs the question. He is known to be original in conception and emphatic in utterance, with all the courage of his convictions. Such characteristics seldom fail to carry with them that of consistency, and it is therefore entirely reasonable that he should not attempt to reconcile two inconsistent propositions (a), that engine 385 does not, in view of her claimed capabilities, require an extension as a netting receptacle and cinder holder, and (b) that she should be fitted with an extension to perform such functions. Whether or not he or his firm recommend or approve the application of an extension to a compound locomotive, by reason of its supposed spark arresting capabilities, remains entirely a matter of conjecture.

The advocacy of the extension from this latter point of view, by the Baldwin Locomotive Works, has been heretofore so pronounced as to be almost proverbial, and has gone to such length as to elicit from them the following remarkable statement, which is quoted from their letter to Hon. Charles A. Goodchap, Commissioner of Railways, Sydney, New South Wales, as published in the *Railroad Gazette* of June 1, 1888, p. 345, viz.:

"6. The extension smokebox, in connection with a straight stack, is now generally in use in this country. *It relieves much of the back pressure on the cylinders*, while being one of the most efficient spark arresters known."

The citation is made, not with any wish to enter upon a discussion of the correctness of the proposition, or to seek for proof in its support, but merely as to its applicability to compound locomotives, more particularly when provided with fireboxes of ample size, and designed for anthracite fuel of good quality.

Mr. Vauclain's statement that engine 385 has given entire satisfaction to its owners, as evidenced by an order for four more engines "without a single alteration, even in the minutest detail" is simply an argument *ad captandum*, and has no bearing upon the question. The locomotive engine is a machine whose capacity of endurance is phenomenal, and the mere fact that it can be made to perform satisfactory duty, even when handicapped by an extended smokebox, does not, in any sense, indicate that it would not do *better* with a smokebox of such normal dimensions as obtain in other steam boiler practice, and in numerous locomotives in regular service to-day.

It is possible that Mr. Vauclain's sorrowful interjection in the opening of his second paragraph, and his subsequent implied admission of the uselessness of an extended smokebox on a Wootten engine, as well as his statement of the entire satisfaction given by the Wootten Compound (P. & R. 618), *without* an extension, may be indicative of a change of heart, notwithstanding his admission that his firm has built Wootten engines *with* extensions; which error, it is to be hoped and believed, was due to the purchaser and not to the builder. The Wootten engine, however, has, properly, no place in this discussion.

There is no parallelism between the continuity of liquid flow in a force pump and the easier seating of its valves due to an air chamber on the one hand, and the amplification of smokebox volume about an exhaust ejector in a locomotive by an extension, on the other. Further, this theory, which cannot be claimed to be more than a mere dictum, since it is absolutely unsupported by facts or figures, is in direct contravention of those formulated by such recognized authorities on locomotive engineering as D. K. Clark and Zerah Colburn, which prescribe as good practice, a reduction of smokebox volume, and are verified by actual and recorded experimental research and continued service. (See Colburn, Proportions of Locomotive Boilers, *Journal Franklin Institute*, Vol. 27, 3d Ser. 1854, pp. 194-199; Clark, *Railway Machinery*, London, 1855, p. 137; Le Chatelier, Flachat, Petiet and Polonceau, *Guide du Mecanicien Constructeur et Conducteur de Machines Locomotives*, Paris, 1859, pp. 113, 114).

It may be said that this is "ancient history," but so is the extended smokebox, which, according to Mr. M. N. Forney, dates from 1859 in the practice of the Rogers Locomotive Works, and was patented in the United States as a *spark arrester*, by one John Thompson, May 29, 1860, although his modest aspirations did not contemplate an extension of more than about 18 in., and he had no thought of an "air chamber" analogy. That the theories of Clark and Colburn continue to be worked on in good English practice will be seen from a description of Midland express bogie passenger engine and tender No. 1853, exhibited at the Paris Exposition in 1889, in which we find the following:

"*Smokebox.*—The smokebox has been reduced to the same diameter as the boiler, thus greatly lessening its capacity.

"*Blast Pipe.*—It has been found possible, however, in using the smaller smokebox, by slightly decreasing the height of the blast pipe, to increase considerably the blast orifice, several of these engines having blast pipes from 5¼ in. to 5⅞ in. diameter. By doing this the back pressure on the piston has been proportionately reduced, thus conducing to freedom of running at high speeds."

This engine has cylinders 18 × 26, an open stack, and as it is scarcely necessary to say, *no* extended smoke box.

If Mr. Vauclain can cite any well authenticated instance in which, all other conditions as to construction, service, fuel and handling, being equal, an extended smoke-box engine has been found to steam as well as one with a short front, and to be equally economical in fuel, his "air chamber" theory may be accepted as a sound one. The spark arrester question is one which is altogether independent of the extension, and, as before stated, I do not understand him to make it his basis for advocating an extended smokebox. So far as the extension of the opposite end of the boiler is concerned, he can have no more cordial and earnest supporter than myself. Substantial prevention is, in that direction, practicable. How far attempted cure at the other end has been successful may be referred to the experience of the passenger who is rash enough to leave his window open on a day ride, or sufficiently curious to observe pyrotechnic displays before seeking his berth of a night.

J. SNOWDEN BELL.

Compulsory Legislation on Safety Appliances.*

Colonel Haines devoted the first half of his address to a careful review of what the Master Car Builders' Association has done since 1869, in securing united action by the railroads on the coupler question, and supplemented that with an account of the principal legislative and commission hearings, and reports on the subject, and the laws of Massachusetts. These facts our readers are more or less familiar with, and we must omit this part of the address for lack of space. Proceeding to his general argument the speaker said:

I have given you a brief but correct outline of the history of the action on safety appliances by railroad organizations, by state legislatures and by state commissioners. I think that you will agree with me that the railroad companies have no reason to be ashamed of their record. We are now facing the possibility of immediate legislation of a compulsory character, insisted upon as an urgent matter of national importance, and also the probability that, in its eagerness to respond to the appeal for protection to railroad employés, Congress will act without sufficient knowledge as to what has been done and without a proper appreciation of the unfavorable effect which injudicious legislation will have upon the very cause in which we are interested equally with the employés who are to be protected. This will undoubtedly be the case if the principles should prevail which are embodied in some of the numerous bills now under consideration by congressional committees.

These bills generally provide for compulsory legislation of a penal character. . . . The difficulty in the way of prescribing the form of safety coupler with that exactness necessary to make a penal statute effective is said to have prevented the Committee of Railroad Commissioners from agreeing upon a bill, and the same difficulty has evidently been experienced in framing the bills now before the congressional committees. This difficulty it has been sought to avoid in various ways; in some of them by a vote of "members of established and recognized organizations of railroad employés" for the most popular safety coupler, just as they might vote for the most popular conductor or superintendent. In others resort is had to commissioners, who, at the public expense, are to either select a coupler already patented or to devise one themselves. The more or less remote possibilities with such a commission are enough to make such a position more desirable than any other that Congress or the President could bestow. In one or two of these bills there is a recognition of the existence of the Master Car Builders' type and the evidence of an earnest desire to bring about in the interest of humanity the early and general adoption of that type of coupler. For the spirit evinced in such bills we should all have profound respect, even though we should be skeptical as to the results.

The choice of a standard coupler by popular vote of railroad employés recommends itself to some of the advocates of such a course who look for political preferment through the support of labor organizations, but others seem to regard it as the obvious way of arriving at a correct conclusion. To those who sincerly hold this opinion we may say that the brakemen and switchmen

* Address of President H. S. Haines before the American Railway Association, New York City, April 13, 1892.

are no more called on to be acquainted with the proper dimensions and internal locking devices of a vertical hook coupler than with the dimensions and internal mechanism of the watches which they carry. They have only to manipulate the release rod of the one as they have to wind the key or winding stem of the other. That is all they need to know about either, and it is about all that many of them ever will know about a vertical hook coupler. Is it to be held that a matter which has demanded the time and thought of mechanical experts for 20 years in the evolution of the Master Car Builders' type is to be set aside by the popular vote of men whose attention has been concentrated upon the admirably dexterous manipulation of a link and pin? No wonder that many of them express a preference for the device which they have learned to handle with a facility which makes the uninitiated tremble for their safety when they see such a performance take place amid trains of moving cars. The fact is, that the only justification for legislative interference in this matter is that such interference is essential to the protection of railroad employés, and that such protection can be obtained in no other way. If the man engaged to couple cars does not go between them, he is sufficiently protected from injury, and if the railroad company provides a device by which cars can be coupled and uncoupled without the employé going between the cars, there can be no just occasion for legislative interference. This is exactly what has been done by the Master Car Builders and by the American Railway Association. That device is a rod which projects from the side of the car and which has only to be turned partly around to uncouple the car. So long as that rod is there the brakeman or yardman can uncouple the cars without going between them, and so long as that rod fulfills this purpose it is no affair of the yardman or brakeman as to what is at the other end of the rod. But it is of a great deal of importance to the railroad companies, owning together over a million cars. For the change of couplers on all these cars represents to them over $25,000,000, and it is their responsible managers and not the switchmen, who must see to it that this immense sum is not misapplied. That is what has already been done by the adoption of the Master Car Builders' type. Adopted generally in October, 1890, we have reason to believe that it has already been applied to over 200,000 cars, or about one-fifth of all the cars in service, and we have reliable information that in all new construction, say on 25,000 cars now being built or under contract, this coupler will be generally applied. What more can be hoped for from a popular vote of employés? The demand for a removal of all these couplers and the return to the link and pin type? Such a demand has been voiced before the Committee of Railroad Commissioners, as well as before the congressional committees, and the demand has been eloquently enforced by gestures made with hands maimed in the use of just such link and pin couplers. This anomaly in human nature is bewildering to those whose hearts are filled with sympathy for these unfortunates, but it is understood by those who are familiar with railroad service. It is due, primarily, to a reluctance to change from old habits and devices with which we are familiar to those which are novel and strange; next, to a fear that, because of the safety that attaches to the operation of the new device, new men will more readily undertake to fill the positions of switchmen. But there is yet another motive, which has a more rational foundation, and that is the greater difficulty that attaches to coupling a Master Car Builders' coupler to a link-and-pin coupler. While this greater difficulty should be recognized, it does not follow that there is also a greater liability to injury. In the absence of reliable statistics on this point, it may be assumed that, because of the greater difficulty, greater care is habitually exercised in making such couplings and a corresponding diminution in the number of casualties. Be this as it may, such casualties can only occur during the period of transition from the link and pin to the Master Car Builders' coupler, and it has been frequently proved by figures that they must rapidly diminish in frequency after half the number of cars in service have been equipped with couplers of the latter type. The outcome of a popular vote of employés as to a choice of couplers is foreshadowed in an experiment of this kind mentioned in the Massachusetts Commissioners' Report of January, 1891.

It seems that, after the publication of the President's message, to which I have already referred, the New England Railroad Club undertook to obtain from employés engaged in handling cars an expression of opinion "as to the form of coupler which best combines uniformity, automatic action and safety." Out of 1,948 votes, 1,239 were for the Safford Automatic Link and Pin Coupler, 585 were for couplers of the Master Car Builders' type, 63 were for the old link and pin, and the remaining 61 scattering. The Safford Coupler is a great improvement on the old link and pin, but its use with power brakes would be just as impracticable, yet this does not seem to have weighed with the majority of the voters. One objection to the Master Car Builders' type was the difficulty and danger in coupling to it with a link and pin, an objection already shown to be transitory; another was that it could not be made strong enough to withstand the blows to which it must be submitted in terminal traffic, an objection which experience has shown to be without foundation; another, that the expense for repairs would be so great. I make this reference to show how an important question like this would be handled in a popular election contest, and to contrast it with the result of the careful thought expended upon the same question by the Master Car Builders' Association.

So much for the idea of determining by a vote of employés how the railroad companies shall spend $25,000,000 on couplers—an idea which pervades much of the proposed compulsory legislation.

Another idea is that of determining the same matter by a commission composed, for instance, of a master car builder, a yard switchman, a railroad operating official and several outsiders. This commission is to investigate the merits of all couplers presented to them, and the coupler decided upon by a majority of this commission the President of the United States shall proclaim to be the standard safety coupler. Would such a commission be any more competent to decide the question than the commission of technical experts termed the Master Car Builders' Association, or that of managing railway officials termed the American Railway Association? The superior competency of the latter can only be disputed by impeaching the good faith of their members.

And what is there for the proposed commission to determine? It must either decide in favor of the Master Car Builders' type or against it. If the former, such a decision is unnecessary, for railroad companies representing 123,000 out of the 175,000 miles of railroads in this country have already made a similar decision. If such a commission were to decide against the Master Car Builders' type, they must decide in favor of something else. What would that something else be? We know of no other type of coupler in actual use except the link and pin, a type which, as practical tests have shown, cannot be used with power brakes in the same train. Let us leave the advocates of a congressional commission in this dilemma and consider another aspect of compulsory legislation.

It has been said to us: "If you oppose the selection of a safety coupler by a plebiscite of railroad employés or by a congressional commission, what sort of compulsory legislation do you favor?' Our answer may be made in the language of the Massachusetts Railroad Commission: "Those who urge that there should be no legislation at all upon the subject, claimed that the railroad companies were proceeding in the development and adoption of automatic couplers as rapidly as possible, and that any legislation would be likely to saddle upon the country some device, unsatisfactory and imperfect; would impose upon the railroad companies great expense with no corresponding benefit to the employés, and would, in fact, be a bar to progress toward perfection. . . ."

By this statement of the Massachusetts Commission we should be willing to abide; that there is no reason for compulsory legislation unless the circumstances are of a nature so exceptional as to justify it. The only justification for it would be that the railroad companies will not voluntarily protect their employés from injury while coupling cars by the adoption of some safety coupler which has been proved in actual service to serve this purpose. This the companies, members of our Association, have already done without compulsory legislation. But some earnest and sincere friends of railroad employés who admit this say that compulsory legislation is needed to enforce the adoption of the Master Car Builders' coupler upon that minority of railroad companies which stand out against it. To this we reply that, judging of the future by the past, we do not agree in this opinion. We can refer them to the change of gauge of track on the Southern roads, a change of nearly 25,000 miles, substantially in a single day, brought about by organized action of the railroad companies themselves and without compulsory legislation. We can also point to the general adoption of the Master Car Builders' type of coupler on passenger trains—brought about also without compulsory legislation. We say to them that it was only a year or more ago that the freight coupler problem actually passed out of the experimental stage: that already it has been placed on about one-fifth of the cars in service, and perhaps on four fifths of the cars now under construction. We may add that, when the time has come that those railroad companies which have urged this reform are themselves in a position to insist upon it, they will decline to receive any freight car not equipped with the Master Car Builders' type of coupler, as they do to day with passenger cars. All that is now required to side-track a passenger car not so equipped is the car inspector's chalk mark, and that is all the compulsory legislation that we think will be necessary to side-track a freight car when the time has arrived to insist upon it.

If we are asked how long this desirable result is to be delayed, we must each give his individual opinion, for, after all, it must be a matter of opinion. Answering for myself, I will say, substantially, in less time than any advocate of compulsory legislation will insist upon. The good work is going on at an accelerating speed. While a year ago the Master Car Builders' coupler was rarely seen on a train, now it is the exception to find a train without them. The principal manufacturers are enlarging their works to meet the growing demand. On our principal trunk lines it is the rule in repairs to use them in place of the link and pin coupler. With many companies the delay in the general adoption of the standard device comes from inability to make the necessary expenditure at once. The economic question cannot be lost sight of. In these days of a small margin between the rate per mile and the cost per mile, large expenditures cannot be made from income account, and if they must be provided for from capital account many companies must wait until there is a market for their stocks and bonds. How could a compulsory statute with a penal provision be made to apply to a company under such circumstances?

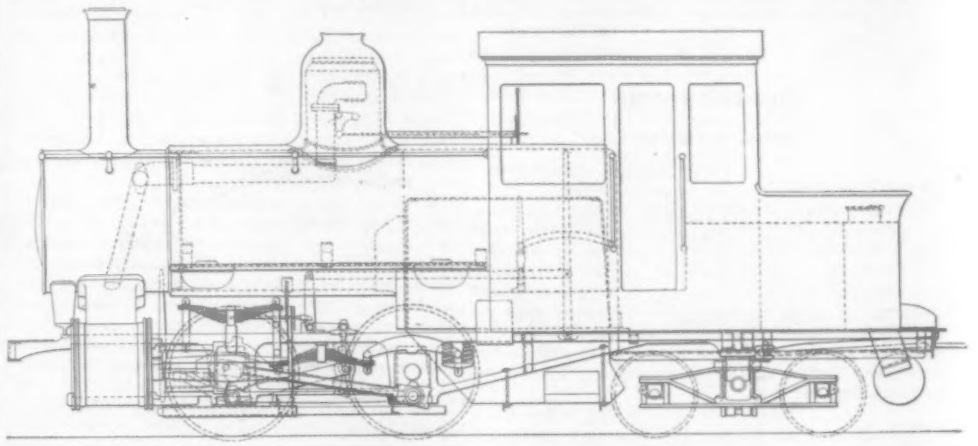
I have trespassed upon your attention beyond the usual limit of time, but I have been urged to do so by my desire to use this opportunity to defend the railroad companies against the charge of indifference to the welfare of their employés. I have sought to show that whatever has been accomplished in this matter of safety couplers has been the work of the railroad companies; that it has been accomplished as rapidly as the state of the art would permit, and that their organized action through the American Railway Association has rendered compulsory legislation on safety couplers unnecessary.

Compound Locomotives for the Chicago & South Side Rapid Transit.

A general description of the compound locomotives for the "Alley" elevated road in Chicago has heretofore been given in the *Railroad Gazette*. These engines are approaching completion at the Baldwin Works, and one is being tried on the Philadelphia & Reading to test its hauling capacity. The accompanying illustration shows the general outline; further interesting details and sections will follow later. The engine is essentially a Forney engine; a type that has proved more satisfactory than any other for elevated road service. The general dimensions are as follows:

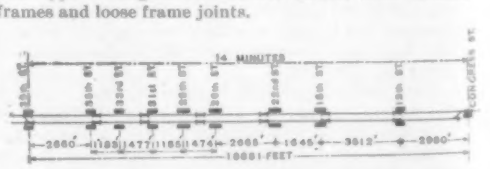
Cylinders (Baldwin compound), 9 and 15 × 16 in.
Boiler, straight top, 46 in. in diameter.
Firebox, 64 × 44 in.
Flues, 167, 1¾ in., 76 in. long.
Grates, suitable for bituminous, anthracite or slack coal.
Truck wheels, 26 in. in diameter.
Weight in working order, 56,000 lbs.
Weight on drivers, 40,000 lbs.
Driving wheels, 42 in. in diameter.
Driving-wheel base, 60 in.

The frames are of wrought iron, all in one piece; the driving wheels of wrought iron, the driving boxes of phosphor bronze, the driving and truck axles of steel. The firebox is of the radial stay type. These engines have the following specialties: United States metallic packing, Westinghouse automatic air brakes, inside injector checks, steel cabs, pressed steel casings, Vauclain wrought iron drivers and truck wheels and piston valves. The boiler sheets and joints are suitable for 200 lbs. working pressure. The engine has muffled safety valve and exhaust, pressed steel smokebox doors, asbestos plaster lagging, and a cinder pocket to extinguish sparks at the front end. The injectors are Mack & Nathan, and the engine is equipped for the Gold continuous car heating system. There are sandboxes both front and back of the drivers.



COMPOUND LOCOMOTIVE FOR CHICAGO ELEVATED RAILROAD.

The material for these engines was all specified to meet unusually rigid physical tests and it has been made to meet the requirements. The firebox sheets are guaranteed for five years against laminations, on the theory that if lamination does not exist when the sheets are made it will not occur afterward, and is no protection against laminations except by guaranty, as it is almost impossible to determine whether a sheet is laminated at the centre or not. Freedom from laminations depends upon the honesty of the plate maker and the care taken in the manufacture. The frames of these engines are made unusually heavy and all in one piece, with a view to reducing the trouble previously experienced with this type of engine in elevated service from broken frames and loose frame joints.



The Chicago & S. S. R. T. Railroad—Positions of trains at 8 a. m., under proposed time table (starting at two-minute intervals, maximum speed 25 miles an hour, estimated duration of each stop, 17 seconds.)

The Baldwin Locomotive Works have in these engines made a special effort to meet all the specifications and to construct what they expect will prove the most durable elevated engine ever built. The heating surface of the firebox and the grate area are unusually large, and it may be that a cheap grade of anthracite fuel can be used. The dome is attached to the boiler by a heavy pressed steel base, as shown. The boiler sheets and the dome sheets are not flanged, but each is riveted to the flange ring. Every possible provision has been made to prevent oil and water from dripping to the streets.

The designs for these engines were made by Mr. D. L. Barnes, Consulting Engineer, under the direction of Mr. R. I. Sloan, Chief Engineer of the railroad company. An endeavor has been made to remove as far as possible all the difficulties experienced with elevated engines in other cities and of other designs. The Baldwin Locomotive Works have guaranteed the power of the engine to accelerate the trains. The engines are painted black with an aluminum stripe.

The work that these engines will have to do will probably be best understood by the accompanying diagram, which shows the location of the stations on the first four miles of road. The average speed between

terminals, including stops at every station, is to be about 15 miles an hour, which is considerably faster than the average speed on the New York elevated lines. This high average velocity is necessary to compete with the cable road, which for some considerable distance runs parallel to the elevated. Of course the cable road has the advantage of not having to make every stop. Sometimes a cable train will run, during the busy hours of the day, for a mile without stopping, the passengers, mostly men, jumping on and off the cars. The speed of the cable is about 14 miles an hour.

The trains which this locomotive will have to haul weigh about 100 tons in addition to the locomotive, or 128 tons in all. It is expected that during the World's Fair the trains will consist of six cars, carrying 100 passengers each. There are but few grades on the line, the steepest being about 53 ft. to the mile. The entrance to the World's Fair grounds will have to run above the elevated tracks of the Illinois Central, but the grade at this point is not yet determined. The terminus of the road in the World's Fair grounds will be north of the Transportation building annex. It will be a stub terminal, having from six to eight stub tracks all feeding into the main line.

The Proposed Underground Electric Railroad in Paris.

In July of last year the municipal authorities of Paris undertook to institute an inquiry into the problem of building an underground electric railroad to connect the Bois de Boulogne with the Bois de Vincennes, and, as an outcome, have since held under consideration a project proposed by M. Berlier and already briefly noticed in the *Railroad Gazette*. The favor with which this project has been regarded seems to give promise of its ultimate execution, and the *Revue Industriel'e* in a recent issue give a comprehensive account of it, together with a number of illustrations showing the location of the proposed line and some of the details of the work to be done. From this we extract the following particulars:

The line will traverse Paris in the direction of its greatest length, from east to west, and will follow, approximately, the course of the River Seine. The total length of the line, as now held in view, is about seven miles. Two forms of cross section for the tunnel have been fixed. One of them, shown in fig. 1, is circular and calls for a cast iron tube, 5.8 metres (about 19 ft.) in diameter outside and 5.55 metres (about 18.2 ft.) in diameter inside. This tunnel is to have two tracks and is to be built up of cast iron sections, bolted together through projecting lugs. Empty spaces on the outside of the tunnel tube, between it and the tunnel excavation, are to be filled in by injecting beton.

The minimum radius of curvature of the line where this form of tunnel is to be used has been fixed at 100 metres (328 ft.) Where smaller radii of curvature are unavoidable or where the road is to run at a comparatively slight depth below the surface of the ground, the tunnel section is to be rectangular, with masonry walls and an iron roof. This form of section is shown in fig. 2, which shows the cars on a curve.

Of the whole length of the road, about 30,927 ft. are to run in the cast iron tube tunnel; about 1,286 ft., in the rectangular tunnel; and about 4,628 ft. are to be taken up by stations.

Electrically considered, the line will be divided into two sections. One of these, about three kilometres long, will be supplied with current from a station on the Boulevard Flandrin, in connection with which there will be a repair shop. The remaining eight kilometres, on which the traffic is expected to be particularly heavy, will be supplied from a second station, located about centrally, on the banks of the Seine, so that the coal supplies and the removal of ashes may be handled by river carriage, and thus occasion the least possible annoyance to the surrounding districts.

Both terminal stations of the road, at the Bois de Vincennes and the Bois de Boulogne, will be close to the stations of the Metropolitan belt line of street cars. At the Bois de Boulogne the stations of the metropolitan and of the underground roads will be practically on the same level. Nearly all the intermediate stations will be alike and will be underground. They will be formed by rectangular excavations with masonry walls and iron roof, entrance and exit being accomplished by stairways ending in small kiosks on the street level.

A current tension of 450 volts is to be employed. The current will be supplied to the motors on the cars by a feed wire, laid on the wooden cross ties between the tracks and sheet metal contact pieces. The main electric conductor will be in a separate conduit between the two lines of track, as shown in fig. 1. The return current will go through the rails. The conduit just mentioned will also serve drainage purposes, carrying any possible water accumulations to catch basins along the line, from which the water will be pumped into the sewers by small electric pumps. Excessive noise of passing trains is to be prevented by layers of india-rubber between the rails and ties.

The trains, in general, are to be made up of four long cars. Two of these cars will be motor cars and each will be fitted with two 25-H. P. dynamos working directly on the driving axles. The arrangement to be adopted will be such that all the motors in the train will be under the control of the motorman on the front platform of the leading car.

The train speed calculated on is 20 kilometres (about 12½ miles) per hour, though this could be increased to 25 kilometres (about 15½ miles), should the needs of the service be such. First and second class compartments in the cars have been determined upon provisionally, but this, it has been argued, will be apt to give rise to confusion and delays at stations, and it seems probable that one general class with one rate of fare only will be finally adopted.

From what has been said of the tunnel it will, no doubt, have already been inferred that a shield will be used in its construction, on essentially the same plan followed in the St. Clair tunnel, in this country, for example. The total cost of building the road has been estimated at 41,000,000, francs, or about $8,200,000.

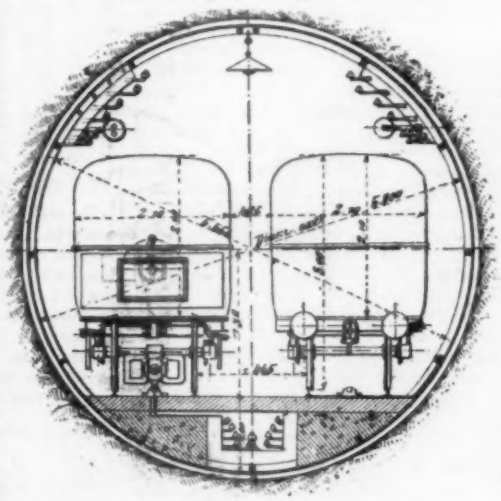


Fig. 1.

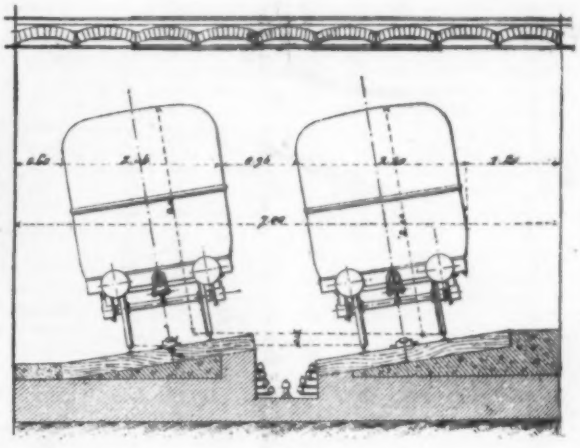


Fig. 2.

Proposed Underground Railroad for Paris.

Signals on the New York Division of the Pennsylvania Railroad.

The above-named piece of road is doubtless better provided with signals than any other stretch of equal length in the country, and as it is also of interest to signalmen from a historical standpoint, having had the first block signaling (about 1864) and the first English interlocking (February, 1875), we reprint a list of the interlocking on the division, which has been prepared by the Supervisor of Signals. The table, it will be observed, shows only regular interlocking towers. Besides these, there are distant signals for all facing point switches, numerous block stations where there are no switches, and draw-bridge signals. There are 72 block stations on the division (87 miles).

The total number of signals in use is 664. The increase since 1890 is 77, besides which 41 non-standard signals have been supplanted by semaphores. The first date column in the table shows data for the original towers, which have been superseded or radically enlarged. The first three towers *A*, *N A* and *R U*, belong to the Jersey City pneumatic plant, which also includes some automatic block signals.

The Empire State Express.

As most of our readers know, the New York Central & Hudson River road has made the experiment of running the fastest train in the world, on long regular daily trips, and has kept it up throughout an American winter. This interesting test has now been completed—that is, it has been continued through the severest season of the year—and we present below the train-sheet record for the four months since the train was put on.

The train began running Oct. 26 and up to the 1st of April had run 136 days, being every day except Sunday. Of these trips, 80 show a clear record; that is, the train was on time at each point reporting. To make the table more easily readable we omit from it these clear-record days, though we do this with regret, as it is natural that the superintendents and train masters should take pride in those portions of the train sheets which show the longest uninterrupted series of "ot" (on time). It will be seen that the ten days from March 21 to 31 show no irregularities. In two other instances this clear record was kept up for a week or more. Of the 56 records containing irregularities shown in the table, 18 show "ot" at Buffalo. These, of course, are marks of special credit rather than discredit, as they indicate that more or less time was made up. On Jan. 11 eight

INTERLOCKING ON THE NEW YORK DIVISION OF THE PENNSYLVANIA RAILROAD.

No.	Call.	Location.	First interlocking.	Put in service.	Levers. Switches.	Signals.	F. P. locks.	Total levers.	Spare spaces.	Functions. Signals. Home.	Distant.	Dwarf.	Pot.	Total signals.	Switches.	Locks.	Total No. functions.
1	A	Washington street		May 17, '91	28	37	....	65	6	32	6	20	....	58	44	44	146
2	NA	Newark avenue		Nov. 29, '91	10	14	....	24	11	12	3	5	....	20	17	17	54
3	RU	New Jersey Junction		Nov. 29, '91	8	11	....	19	4	15	6	5	....	26	14	14	54
4	SC	Shanley's Cut		July 19, '84	5	21	6	32	....	17	4	....	....	21	10	10	41
5	DN	Marion Tower		Sept. 12, '84	3	11	2	16	....	6	4	2	....	12	5	3	20
6	M	E. End Meadows		Feb. 17, '90	17	0	0	17	1	....	....	....	....	....	17	....	17
7	OS	W. " "		Oct. 26, '87	15	0	0	15	1	....	....	....	....	....	16	....	16
8	NK	Harrison Tower		Feb. 11, '75	7	12	3	22	2	10	2	....	....	12	11	6	29
9	KY	Passaic Bridge		June 18, '82	3	5	4	12	....	4	2	....	....	6	5	4	15
10	JM	Centre Street Junction		Sept. 13, '85	2	8	1	11	1	4	2	2	....	8	2	1	11
11	RD	West Newark Junction		Sept. 16, '91	11	24	8	43	5	13	3	8	....	24	18	18	60
12	WA	Waverly Tower		Feb. 7, '89	10	16	8	34	2	8	4	7	....	19	20	20	59
13	PX	Perth Amboy Junction	Nov. 5, '82	Sept. 27, '91	13	28	12	53	3	17	4	7	....	28	26	26	80
14	QW	Long Branch Junction		March 3, '88	2	5	1	8	2	4	3	....	....	7	3	3	13
15	HU	Metuchen Tower	March 18, '84	Jan. 6, '90	7	13	3	23	9	12	4	2	....	18	15	15	48
16	BU	East Brunswick	Oct. 16, '82	Aug. 15, '91	4	12	4	20	....	5	2	5	....	12	8	9	29
17	U	New Brunswick Tower		July 8, '86	....	3	1	4	....	2	1	....	....	3	....	1	4
18	JH	New street, New Brunswick		Jan. 20, '89	2	4	1	8	....	4	2	....	....	6	4	2	12
19	CN	Millstone Junction		Nov. 15, '89	7	13	5	25	7	10	4	4	....	18	14	13	45
20	X	Monmouth Junction	June 11, '89	Dec. 1, '89	10	17	7	34	14	13	4	6	....	23	18	17	58
21	C	Princeton Junction		March 14, '90	6	13	6	25	7	11	4	3	....	18	12	12	42
22	MO	Millham Junction		Feb. 25, '89	8	15	8	31	5	10	4	6	....	20	14	14	48
23	DO	Monmouth street, Trenton		Dec. 22, '89	8	8	7	23	5	6	2	7	....	15	13	11	39
24	SV	Morrisville		April 5, '90	4	11	1	16	....	6	2	7	....	15	6	6	27
25	BD	Bristol		March 11, '89	7	12	5	24	8	9	4	....	3	16	14	8	38
26	KX	Cornwells		Feb. 13, '90	6	14	4	24	8	10	4	5	....	19	12	11	42
27	HG	Holmesburg Junction		Sept. 26, '86	8	22	5	35	1	12	4	....	6	32	15	12	49
28	FJ	Frankford Junction	Sept. 19, '77	Nov. 13, '87	11	24	9	44	8	14	4	7	....	25	21	21	67
29	GD	Germantown Junction		June 15, '84	9	17	6	32	4	14	4	3	....	21	16	10	47
30	BX	E. End Schuylkill	May 5, '84	Sept. 19, '89	3	4	1	8	....	4	2	....	....	6	4	2	12
31	3	Mantua	Oct. 9, '81	Dec. 30, '87	5	12	5	22	2	8	2	2	....	12	10	10	32
					240	406	123	769	116	292	96	113	9	510	404	340	1,254

minute's time was made up between Lyons and Buffalo, and a number of other feats equal to this, or better, will be observed by an examination of the table. The train reached Buffalo on time on 72 per cent. of its trips, and within five minutes of its time on 108 days, equal to 79 per cent. Other interesting notes are printed at the foot of the table.

This train is so well known that further description of it is scarcely needed, though we will say in brief that it consists of an engine and four cars, weighing about 230 tons; leaves New York daily except Sunday at 9 A. M., and is scheduled to run to Buffalo, 439.6 miles, in 8⅜ hours, being at the rate of 50.70 miles an hour through, including stops. Five-minute stops are made at Albany and Syracuse, where engines are changed, and shorter stops are made at Utica and Rochester. The sum of the ascending grades is 1,855 ft., and the sum of their length is 144 miles. The locomotives have 78-in. drivers and 19 × 24-in. cylinders; heating surface, 1,821.5 sq. ft. and grate area, 27.3 sq. ft. Weight of engine, 60 tons; on driving wheels, 40 tons.

N. Y. C. & H. R. R. R.; TRAIN NO. 51. EMPIRE STATE EXPRESS.

Extracts from train sheets, Oct. 26, 1891, to April 1, 1892, showing the days on which time was lost and the number of minutes behind time at which the train arrived at and departed from the end of each division.

		N.Y.	Albany.		Syracuse.		Buf.
			Arr'd	Left.	Arr'd	Left.	
Oct.	26	ot	ot	ot	9	7	2
	7	ot	ot	ot	3	1	11
	28	ot	8	7	9	6	ot
Nov.	2	ot	1	1	51	49	61
	5	ot	25	23	11	8	5
	6	ot	28	28	18	16	10
	10	ot	ot	ot	3	ot	ot
	13	ot	ot	ot	ot	ot	25
	17	ot	ot	ot	ot	ot	14
	18	ot	ot	ot	5	2	15
	19	ot	ot	ot	3	ot	ot
	21	ot	ot	ot	ot	ot	3
	24	ot	ot	ot	ot	ot	5
	26	ot	ot	ot	ot	ot	2
	28	ot	ot	ot	ot	ot	58
Dec.	3	ot	ot	ot	ot	ot	46
	4	ot	ot	ot	ot	ot	4
	12	ot	ot	ot	2	2	ot
	16	ot	18	17	27	25	25
	17	ot	11	9	22	22	24
	18	ot	ot	ot	3	2	ot
	23	3	20	18	5	3	37
	25	ot	28	25	12	10	ot
	26	ot	ot	ot	ot	ot	4
	30	ot	5	2	4	1	ot
	31	ot	13	11	12	11	ot
Jan.	1	ot	3	ot	ot	ot	ot
	5	ot	ot	ot	2	2	ot
	6	ot	5	3	ot	ot	ot
	7	ot	ot	ot	4	3	28
	8	19	6	6	ot	ot	3
	11	ot	ot	ot	ot	ot	8
	13	2	ot	ot	ot	ot	ot
	15	ot	28	27	20	18	6
	16	ot	3	3	ot	ot	ot
	19	ot	1	ot	28	28	45
	20	ot	30	30	43	50	50
	26	ot	50	48	67	70	103
	27	ot	28	28	43	44	55
	28	ot	ot	ot	ot	ot	3
Feb.	5	ot	ot	ot	ot	ot	15
	8	ot	15	17	ot	ot	ot
	12	ot	1	ot	15	16	31
	13	1	ot	2	24	49	.
	16	ot	ot	ot	ot	ot	7
	17	ot	17	15	12	11	16
	19	ot	ot	ot	9	8	ot
Mar.	1	ot	12	10	ot	ot	ot
	2	ot	16	15	5	5	ot
	7	ot	ot	ot	5	13	9
	11	ot	ot	ot	150	178	220
	14	8	7	7	26	27	40
	15	ot	ot	ot	17	17	17
	17	ot	ot	ot	ot	2	ot
	18	ot	6	5	ot	ot	ot
	19	ot	ot	ot	7	7	5

EXPLANATION OF DETENTIONS.

Jan. 7. Snow and head wind. Transferring passsegers at Rochester. Water.
8. Water.
11. *Detained 16 minutes west of Syracuse; half of the lost time was made up.
15. Snow.
19. Snow.
20. Disabled train ahead.
26. Head wind.
27. Head wind.

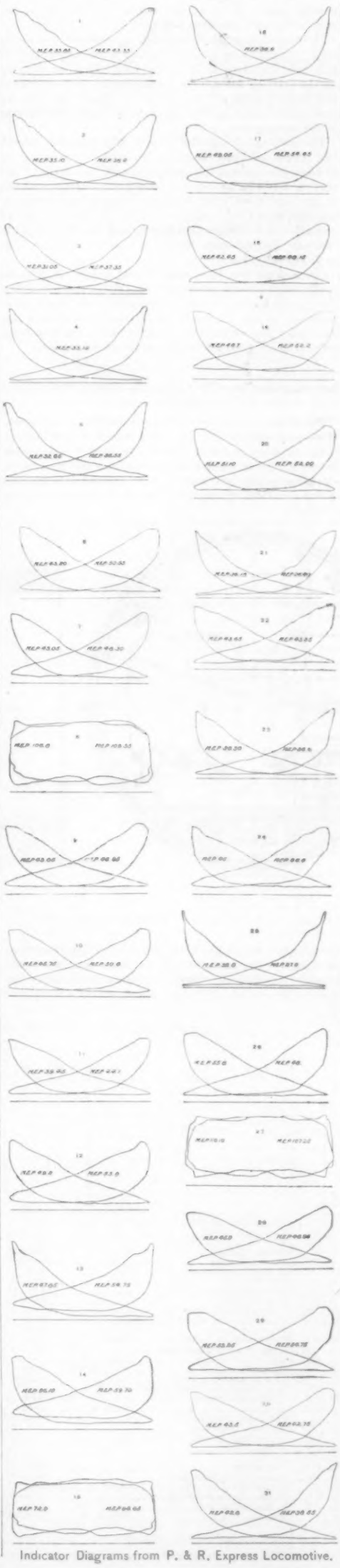
Feb. 5. Byron, water; short supply at Churchville.
8. Detained 15 minutes by disabled work train ahead.
12. Snow storm. Coupling engine, Syracuse. Water. Transferring passengers, Rochester.
13. Steam heat. Snow. Head wind. Water. Thawing out drip.
16. Water, Rochester.
17. Broken air whistle. Water. Putting on air hose.

Mar. 1. Storm and wind.
2. Storm and wind.
7. 13 minutes on account of storm. 6 minutes Rochester, water.
11. Delayed on account of snow storm. 6 minutes Rochester, water.
14. 8 minutes New York. Defective steam hose. 5 minutes on account of storm. 5 minutes Utica, water. 8 minutes account of storm and wind. 1 minute Syracuse, steam. 13 minutes Rochester, inspection and water.
15. Wreck between Oneida and Canastota. 5 minutes Rochester, water.
17. 2 minutes Syracuse, uncoupling engine.
18. 7 minutes account disabled train ahead.
19. 7 minutes on account snow and head wind. 2 minutes Rochester transferring passengers and baggage, and 4 minutes water.

Details of Philadelphia & Reading Express Locomotive.

In the *Railroad Gazette* of March 18 there was an illustration of one of the fast express locomotives on the Philadelphia & Reading road. At that time we referred to the design of boiler, the variable exhaust, and the somewhat remarkable indicator cards taken from the engines, and we now give further details on these points.

It will be remembered that the Reading was the first road to make extensive use of long travel and wide outside lap for locomotive valves. It is this arrangement of valves that gives the results shown by the indicator cards herewith printed. The data respecting these cards is given in the accompanying table. Card No. 24, taken at a speed of 70.9 miles per hour, or 348 revolutions per minute, is, we believe, the best indicator card ever taken from a locomotive at that speed.



Indicator Diagrams from P. & R. Express Locomotive.

Data from Indicator Cards taken on Philadelphia & Reading Locomotive No. 1,015.

No. of card.	Speed in miles, per hour.	Revolutions per minute.	Boiler pressure, lbs. per sq. in.	Cut off in inches.	Mean effective pressure, lbs. per sq. in.	Minimum back pressure, lbs. per sq. in.	Inside lap of valves, inches.	Weight of train, lbs.
1	61.1	300	.....	6	39.6	12	1-64	312,700
2	63.6	312	.....	5	36 8	9.5	"	312,700
3	63.6	312	.....	5	34.2	6.5	"	312,700
4	57.4	282	.....	4	33.2	5	"	312,700
5	59.9	294	.....	4	34 1	6	"	312,700
6	52.1	256	150	6.5	45.9	11.5	"	288,600
7	58.3	286	150	6.5	45.7	11.3	"	288,600
8	27.7	136	155	22	108.1	14.5	"	288,600
9	59.5	292	145	6.5	45.0	13	"	288,600
10	53.1	262	145	6.5	48.1	8	"	288,600
11	59.9	294	150	6.5	41.8	11	"	288,6 0
12	57	280	140	6.5	52.5	10	"	288,600
13	47.7	234	.....	5	54.3	7	¼ negative.	288,600
13	44	216	150	6.5	57 9	13	"	288,600
15	22	108	145	22	83.7	16	"	288,600
16	55	270	.....	4	39.9	7	"	288,60
17	51.3	252	145	6.5	51.8	13.5	"	288,600
18	59.9	294	145	6.5	45.3	15	"	288,600
19	62 3	306	150	6.5	48.5	18	"	288,600
20	52.5	258	150	6.5	51.6	16	"	288 600
21	66	324	140	4	31.3	6	"	312,700
22	67.2	330	140	6 5	43 4	14	¼ negative.	312,700
23	63 6	312	.....	6.5	38.0	8	"	312,700
24	70 9	348	145	6.5	44 7	15.5	"	312,700
25	46.5	228	.....	4	30.4	4	"	288,600
26	53.8	264	150	6.5	51.9	13	"	288,600
27	24	119	150	22	113.7	17	"	288,600
28	59.9	294	130	6.5	46.4	12.5	"	288,600
29	57.4	282	135	6.5	54.0	14	"	288,600
30	59.9	294	.....	6.5	43.1	12.5	"	288,600
31	64.9	318	.....	4	31.1	9.5	"	288,600

The boiler shown in figs. 1 and 1*a* is strictly of the Wootten type. It has a combustion chamber in front of the firebox, radial stayed crown and two firedoors, and there is a brick arch at the front end of the box. The grates are of water tubes. This is the most powerful type of locomotive boiler used, owing to the large proportion of grate area. The steam capacity, with good coal, is much greater than is necessary to supply the cylinders of a locomotive under any conditions. Hence, a very low grade of fuel can be used. The difficulty has been to reduce the blast sufficiently to permit the use of a finely divided fuel in passenger service, and a variable exhaust nozzle, shown in fig. 2, is used to reduce the exhaust when necessary to prevent tearing up the fire. Perhaps the capacity of these boilers will be best appreciated when it is stated that three safety valves are necessary to relieve the pressure when the engine stops after a hard pull.

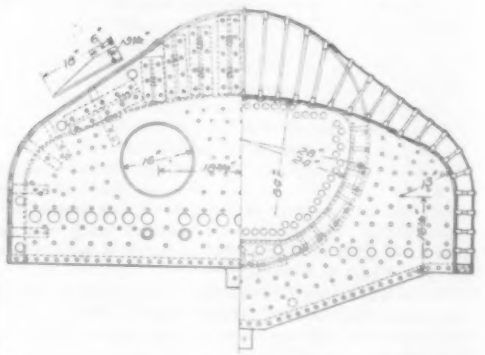


Fig. 1*a*.—Cross-Section through Firebox—Philadelphia & Reading Express Locomotive.

The variable exhaust nozzle is the simplest used in this country. It consists of a double conical plug that is raised and lowered inside of the exhaust pipe by means of a short lever, fulcrumed at the side of the pipe, as shown. The lever is connected to the cab, where it can be operated by the engineer or fireman. This nozzle, when used with anthracite coal, gives little or no trouble by clogging up.

The fire in this class of boiler is so large that with good fuel it is difficult to regulate closely, and the boiler is therefore more particularly adapted to fuel that cannot be burned in the ordinary locomotive boiler. A number of Western roads, which are in a measure compelled to use poor coal, have tried it, and it has proved a success. This type of boiler represents strictly the true stay construction. In fact, it could be built in no other way. The repairs to these fireboxes are not greater in proportion to the number of stays than with other locomotive boilers, but owing to the large crown sheets the stay bolts require close inspection, and they should all be drilled with "tell-tale" holes, as it is essential to dis-

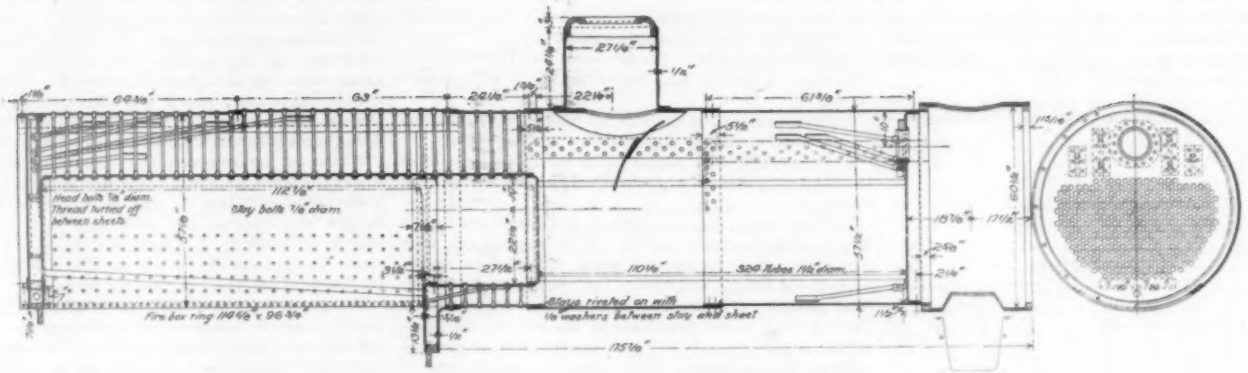

Head bolts 7/8" diam. Thread turned off between sheets
Stay bolts 1/16" diam.
Fire box ring 114 5/8" x 96 3/4"
Stays riveted on with 1/8" washers between stay and sheet
320 Tubes 1 1/2" diam.

Fig. 1—Wootten Boiler for Philadelphia & Reading Express Locomotive.

cover broken bolts before there is any considerable number of them.

After considerable investigation into the durability of this and other radial stay boilers, we have been unable to find any proof that they are unsafe or expensive to maintain. Those who have used them most, and have given them intelligent care, speak highly of them and have continued their use, until now the radial stay type

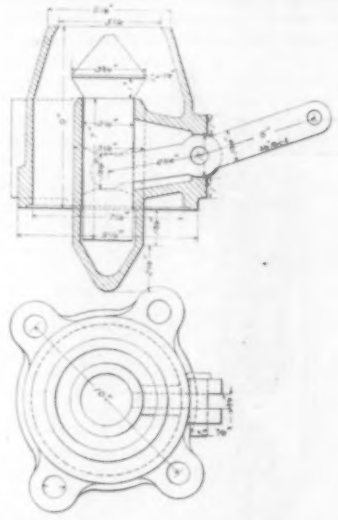


Fig. 2—Variable Exhaust—Philadelphia & Reading Express Locomotive.

is the favorite with a majority of our locomotive builders and with a large number of roads that have to contend with bad feed water. Discussions of radial stay construction were given in the *Railroad Gazette* last year (issues of March 6 and 13 and May 1.)

Foreign Railroad Notes.

The latest of the high mountain roads in Switzerland is that up the Rothhorn, 7,240 ft. high, from the lake and town of Brienz, not far from Interlaken. The road was completed so that a locomotive reached the summit Oct. 31, and will be opened the coming season. The Rothhorn ought to command a magnificent view of the Jungfrau, and the other mountains south and southeast of Interlaken. The material through which the 11 tunnels of this line were excavated consisted of débris which had slipped down the mountain, and which seemed disposed to go on sliding when disturbed. Subterranean springs also made the work difficult, and in places new beds had to be made for mountain streams. The work was done by contract for $350,000. When subscriptions were invited for the enterprise the capital stock of 1,500,000 francs was subscribed 87 times over; but in spite of that, when the time for paying the last installment (Dec. 31 last) was past, only shares to the amount of 352,100 francs were paid up. The other subscribers have paid in 43 per cent. of their dues, but the company now has a right to declare this forfeited.

Wurtemberg introduces "standard" time April 1, in the time-tables addressed to the public as well as in the interior railroad service. The cities of Stuttgart, Heilbroun and Tübingen have already resolved to adopt it for all purposes. Baden introduces standard time on the same date.

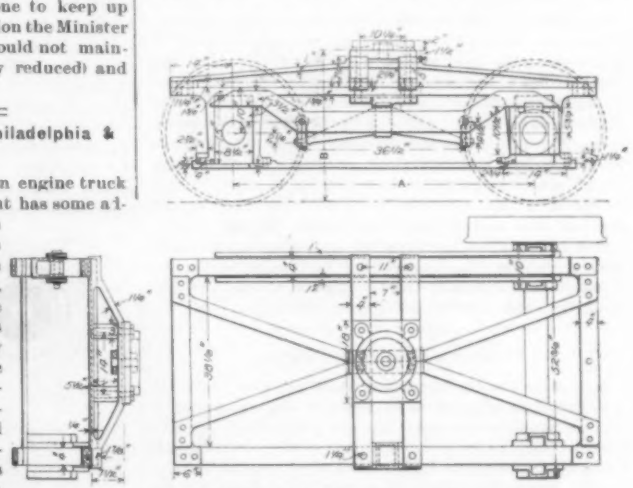
Some time ago the Russian Minister of Transportation was summarily removed. His successor has now been appointed, whose career is described as follows: Ssergej Juljevich Witte (a good German family name), the new minister, was born in 1849 in Tiflis, not far from Mt. Ararat, where his father was a member of the government of the Caucasian provinces. He studied in the University of Odessa, where he took a degree in mathematical and physical sciences, and then entered railroad service on the staff of the Odessa Railroad. He soon became one of the confidential assistants of the manager of the Russian Steamship and Trade Co., and held the position of Assistant Superintendent during the whole Turkish war, where he gained a reputation as an efficient administrator. In 1879 he went to St. Petersburg, where he held a place as a sort of assistant general superintendent of the Southwestern Railroads, and prepared for a railroad investigating committee a volume on the "History and Proceeding of the Congress of Representatives of the Russian Railroads." From 1880 to 1885 he was Superintendent, and then till 1888 Manager of the Southwestern Railroads, whose prosperity is largely credited to him. He then entered the government railroad department at the head of the rate commission, where he has been very effective. He has written many articles for periodicals and a volume on the "Principles of Railroad Rates."

Russian railroad earnings last November were very nearly the same as the year before. There was a decrease of 7 per cent. in the number of passengers carried, and of ⅛ of 1 per cent. in the quantity of freight moved. The average haul has been longer this year since harvest, because the distance the grain is carried to the places which have a short supply is greater than it would go by rail to be exported. For the 11 months ending with November the earnings are the largest ever known, but a statement of the number of passengers carried shows that while these increased from 31.4 millions in 1886 to 35.7 in 1889, they then suddenly fell to 27.2 millions in 1890 and 27 in 1891; while the quantity of freight hauled has increased without interruption, and was 38 per cent. greater in 1891 than in 1886. Nearly all this growth was in the first two years, however; since 1888 it has been less than 7 per cent. The marked recent change is the great decrease in passenger traffic, amounting to 24 per cent. from 1889 to 1890, indicating very hard times before the last harvest and only a year after one of the best Russia has ever had.

A tax on transportation having been proposed in Austria, energetic protests were made by almost all chambers of commerce and other bodies representing shippers. To the deputies of one of them the Minister of Commerce declared that there was an important decrease in the earnings of the state railroads, which was the more serious because accompanied by an increase in expenses, and that something must be done to keep up the national income. To another deputation the Minister of Finance said that the state railroads could not maintain the present rates of freight (recently reduced) and would be obliged to raise them shortly.

Truck for Express Locomotives, Philadelphia & Reading.

The accompanying illustration shows an engine truck which is not unique in general design, but has some admirable features in the details. It will be noticed that the side frames have the jaws forged on to the top bars, not unlike an engine frame. The top frame is 4 in. wide and 1¼ in. thick. The open space in the jaw is 15 × 8½ in. The transoms are made of forgings, as shown, and they are planed out and lipped over the side frames. These forgings, with the thimbles between the upper and lower members, form a decidedly strong truss, and altogether this engine truck has the fewest parts of any in common use in this country. Trucks of this kind have been in service for a long time and are still in good condition. They have few parts to get out of order and while they may be somewhat more expensive than the ordinary form with cast iron jaws they are stronger and more durable. The class of engines on which this truck is used was illustrated in the *Railroad Gazette* of March 18.



Truck for Philadelphia & Reading Express Locomotive.

A Pass Fraud.

Mr. C. A. Barattoni, New York Agent of the London & Northwestern, informs us that a person calling himself C. H. Cook, Assistant Superintendent and Civil Engineer of the London & Northwestern, has been obtaining transportation favors from American railroad officers by false representations. No such person is connected with the London & Northwestern in any official capacity whatever.

Power Necessary to Haul Trains Up Various Grades.

Following is a table giving the horse power per ton of train which must be provided for at the drawbar to haul a locomotive and train up various grades at different speeds. This resistance includes only that due to the grade, and to it must be added all of the other resistances, such as the internal resistance of the engine, the friction of the wheels and axles, the air resistance, etc. This table is of more particular interest just now in view of the recent discussions about high speeds. For instance, an electric railroad is talked of between Chicago and St. Louis, and it is proposed, we understand, to haul trains up a 6 per cent. grade at 100 miles an hour. It will be noticed that at 100 miles an hour the resistance on a 3 per cent. grade requires 16 H. P. per ton. For a 6 per cent. grade it would be 32 H. P. per ton. For 200 tons, which is a comparatively small train, it would be necessary to furnish continuously 6,400 H. P. while traveling up a 6 per cent. grade. Even a 1 per cent. grade at 100 miles an hour causes a large resistance; in the table it is given as 5.33 H. P. per ton. An ordinary passenger train weighing 300 tons would require nearly 1,600 H. P. to overcome the grade alone. Add to this the other train resistances, which would amount to about 1,300 H. P., and we have a total of 2,900 as the power needed to haul a 300-ton train up a 1 per cent. grade at 100 miles an hour.

This table is convenient when determining the capacity of heavy locomotives for mountain grades. Such locomotives find the limitations of their speed up a grade always in the limit of their boiler capacity. Take for instance a decapod locomotive hauling a train weighing 500 tons up a 2½ per cent. grade at 20 miles an hour. The horse power required to mount the grade alone would be about 1,300, and this added to the other resistances would in most cases exceed the steam capacity of the boilers on such engines, yet by dropping the speed to ten miles an hour the boiler would be more than sufficient; so that in rating heavy engines for hill work it is necessary to know about how much horse power would be demanded from the boiler to haul the load up the grade before the speed can be fixed.

There is in all cases of hill work a most economical speed for hauling loads up the grade. To increase the speed is to increase the demand upon the boiler and decrease its efficiency. To decrease the speed too much is to lose time. The actual hauling capacity up grades, as controlled by the weight on drivers regardless of speed, is more generally considered when comparing heavy engines, but the actual capacity of the engine is very much affected by its boiler capacity and ability to furnish steam to generate the power. That is, a locomotive having weight enough on the drivers to haul a given load may be compelled to mount the grades very slowly on account of the limitations of steam production, while another engine of less or equal weight but having a greater boiler capacity, would haul the same load up the grade at a higher speed with the same economy. In

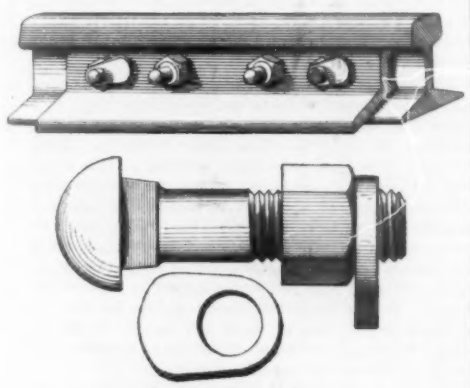
making locomotive tests an allowance should always be made for the difference in speed with which the different trains are hauled up the grades, and for such work the table will be found useful.

HORSE POWER TO HAUL ONE TON UP VARIOUS GRADES AT DIFFERENT SPEEDS, INCLUDING ONLY THE RESISTANCE DUE TO THE GRADE.

Speed, in miles per hour.	Speed in ft. per minute.	Percentage of Grade.									
		.5	1.0	1.5	2.	2.5	3.0	3.5	4.0	4.5	5.0
1..	88	.027	.053	.08	.107	.133	.16	.187	.213	.24	.267
2..	176	.053	.107	.16	.213	.267	.32	.373	.427	.480	.533
3..	264	.080	.160	.24	.320	.400	.48	.560	.64	.72	.800
4..	352	.107	.213	.32	.427	.533	.64	.747	.853	.96	1.07
5..	440	.133	.267	.40	.533	.667	.80	.933	1.07	1.20	1.33
6..	528	.159	.319	.48	.638	.797	.956	1.12	1.28	1.43	1.59
7..	616	.187	.373	.56	.747	.933	1.12	131	1.49	1.68	1.87
8..	704	.213	.427	.64	.853	1.07	1.28	1.49	1.71	1.92	2.13
9..	792	.240	.480	.72	.960	1.20	1.44	1.68	1.92	2.16	2.40
10..	880	.267	.533	.80	1.07	1.33	1.60	1.87	2.13	2.40	2.67
12..	1,056	.320	.640	.96	1.28	1.60	1.92	2.24	2.56	2.88	3.20
14..	1,232	.373	.747	1.12	1.49	1.87	2.24	2.61	2.99	3.36	3.73
16..	1,408	.427	.854	1.27	1.71	2.13	2.56	2.98	3.41	3.84	4.27
18..	1,584	.480	.960	1.44	1.92	2.40	2.88	3.36	3.84	4.32	4.80
20..	1,760	.533	1.07	1.60	2.13	2.67	3.20	3.73	4.27	4.80	5.33
22..	1,936	.587	1.17	1.76	2.35	2.93	3.52	4.11	4.69	5.28	5.87
24..	2,112	.640	1.28	1.92	2.56	3.20	3.84	4.48	5.12	5.76	6.40
26..	2,288	.693	1.39	2.08	2.77	3.47	4.16	4.85	5.55	6.24	6.93
28..	2,464	.747	1.49	2.24	2.99	3.74	4.48	5.23	5.97	6.72	7.47
30..	2,640	.800	1.60	2.40	3.20	4.00	4.80	5.60	6.40	7.20	8.00
35..	3,080	.933	1.87	2.80	3.73	4.67	5.60	6.53	7.47	8.40	9.33
40..	3,520	1.07	2.13	3.20	4.27	5.33	6.40	7.47	8.53	9.60	10.7
45..	3,960	1.20	2.40	3.60	4.80	6.00	7.20	8.40	9.60	10.8	12.0
50..	4,400	1.33	2.67	4.00	5.33	6.67	8.10	9.33	10.7	13.0	13.3
55..	4,840	1.47	2.93	4.40	5.87	7.33	8.80	10.3	11.7	13.2	14.7
60	5,280	1.60	3.20	4.80	6.40	8.00	9.60	11.2	12.8	14.4	16.0
65	5,720	1.73	3.47	5.20	6.93	8.67	10.4	12.1	13.9	15.6	17.3
70..	6,160	1.87	3.73	5.60	7.47	9.33	11.2	13.1	14.9	16.8	18.7
75..	6,600	2.00	4.00	6.00	8.00	10.0	12.0	14.0	16.0	18.0	20.0
80..	7,040	2.13	4.27	6.40	8.54	10.7	12.8	14.9	17.1	19.2	21.3
85..	7,480	2.27	4.53	6.80	9.07	11.3	13.6	15.9	18.1	20.4	22.7
90..	7,920	2.40	4.80	7.20	9.60	12.0	14.4	16.8	19.2	21.6	24.0
95..	8,360	2.53	5.07	7.60	10.1	12.7	15.2	17.7	20.3	22.8	25.3
100..	8,808	2.67	5.33	8.00	10.7	13.3	16.0	18.7	21.3	24.0	26.7
Grade in ft. per mile....		26.4	52.8	79.2	105.6	132.	158.4	184.8	211.2	237.6	264.

Young's Reversible Nut Lock.

This lock consists of an eccentric jam nut $\frac{7}{8}$ in. thick by $1\frac{5}{4}$ in. greatest length, of the form shown in the engraving. When this jam nut is set up tight on the track bolt, on the outside of a square or hexagonal nut, in such a position that the heavy end is on the right side, shocks



Young's Nut Lock.

and vibrations tend to lock the nut more firmly—not to loosen it. If, when tightened up, the heavy end does not come to the right side, it is taken off and reversed. The relation of the pitch of the thread to the thickness of the jam nut is such that the heavy end can always be made to come to the right side by reversing when necessary. It is often, and properly, called a gravity lock, as its own weight makes the lock positive. It will be seen that it can be tightened or removed by the same wrench at the same time the nut is turned, and that its use does not injure the thread of the nut or the bolt.

This nut lock has had large use on Canadian railroads during the past two years and has been approved by Mr. Collingwood Schreiber, Chief Engineer of the Government Railroads, as well as by other officers.

Fletcher's Electric Fog Signal.

As most of our readers know, the trouble and expense incident to running trains in times of fog, constitute a serious condition on most English railroads, especially those in the vicinity of London, where the soot makes a black coating upon each globule of moisture, thus painting the atmosphere black, in a very literal fashion. To run trains safely, and keep them on time, or any where near it, it becomes necessary to have the track repairers all educated to signal trains by torpedoes, and they are required by the regulations to take up their positions by the signals—one man at each distant signal—whenever a fog comes on. They immediately put two torpedoes on the rail, and then closely watch the semaphore, so that whenever it is pulled to the clear position, they can at once take off the torpedoes.

The costliness and the uncertainties of this plan have led to various experiments in the way of automatic apparatus to take the place of the man, and we present below a description of a machine that has lately been tried on the London & Northwestern. It is the invention of Mr. J. W. Fletcher, Telegraph Engineer of the road, and is well spoken of by the operating officers. It will be seen that in this apparatus the detonation does not necessarily take place on the rail, but may be made on a level with the engineman's ear if desired.

The essential parts of the device are the following:

1. A key or switch, with indicator, in the signalman's cabin.

2. Arrangements on the line for making and breaking an electrical circuit by means of the passing train.

3. An upright iron magazine of cartridges, one after the other of which is exploded by means of an electric fuse.

The first part, viz., that which is fixed in the signal man's cabin, consists merely of an instrument very similar to a single needle telegraph showing the words, "Ready for firing," and "Fired" on each side of the vertical needle. A deflection of the latter will therefore show at once to the signalman in his box the condition of this apparatus. When the needle is in an upright position the apparatus is out of action. At the base of this instrument is a brass plug and socket; the signalman inserts the one into the other on the approach of foggy weather, and so throws the instrument into the circuit.

The second part consists of two electrical contacts, placed underneath the rail of the track at the point where the signal is to be sounded, and operated by depression of the rail by the locomotive as it passes over the spot. The contacts are made by the long end of a lever, the short end of which is placed under the rail midway between two sleepers. The vertical movement of this short end is very small, being governed by the elasticity of the rail and the weight on the wheel passing over.

The first contact—fixed near the semaphore signal—when made, completes the whole circuit and fires a cartridge in the magazine, if the semaphore arm be at danger. If the semaphore stands at "all clear," the circuit is broken automatically by the signal lever in the cabin, and the train passing has no effect. The second contact—fixed a short distance ahead of the first (far enough to more than take in the longest train likely to run on the line), breaks the circuit made by the first contact, and actuates an automatic feed mechanism of the cartridge magazine so that another cartridge is brought into firing position ready for the next shot.

The third part of the apparatus consists of the cast iron upright magazine or pillar, fig. 1, which contains a store of cartridges and the various mechanisms for firing these, etc., and is fixed by the side of the road.

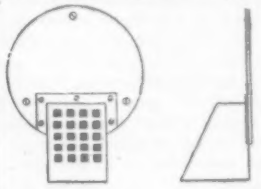


Fig. 3. *Front view of cover.*

Fig. 4. *Side view of cover.*

In the base of the pillar room is found for a small electric battery to give the necessary current for firing each cartridge and actuating the feed mechanism; and a cord and weight to obtain a rotary motion for the cartridge container.

The latter—made of steel—forms really the rim of a small wheel mounted on a horizontal spindle, the cartridges being filled in to a number of short barrels or holes drilled into the rim parallel with the axis. Each barrel comes into firing position when it is the bottommost—that is, it then comes opposite a long brass needle thrown forward into contact for completing the electrical circuit through the cartridge detonator, by means of an armature attracted by two stout magnets side by side. In each cartridge there is a fine piece of wire, forming part of the circuit. When the current passes this wire it is fused, and the heat set up at once explodes the cartridge. There is, therefore, little danger of a misfire, as might perhaps be feared from the ordinary percussion method.

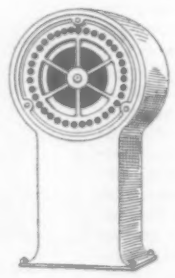


Fig. 1. *Front View of Iron Magazine Showing the Cartridge Container, with Barrels.*

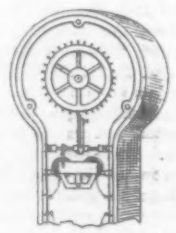


Fig. 2. *Back View of Magazine Showing Step-by-Step Motion for Feeding the Cartridge Container.*

Fletcher Fog Signal.

The armature—when attracted to the magnets by the current passing through them—also actuates a lever and detent which give a step-by-step motion to the wheel-shaped container, thus bringing each barrel consecutively into the firing position. This arrangement is seen in fig. 2, showing a back view of the magazine. A small wheel with pegs fixed in the outer rim serves for the escapement, being mounted on the same spindle as the cartridge container.

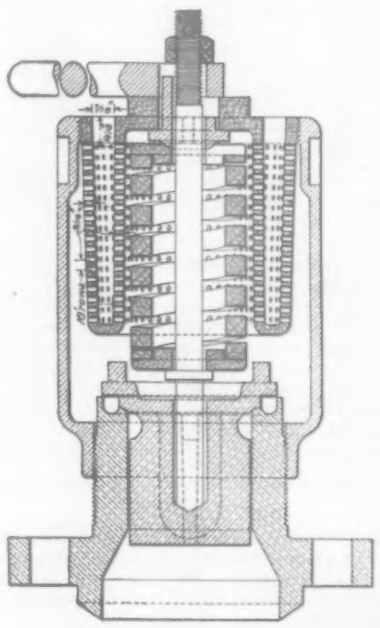
The front cover of the magazine, figs. 3 and 4 (which is of course screwed firmly on for use, though shown separately in the sketch), has a funnel-shaped iron guard bolted on to it, pointing downward so as to cover the discharge hole, and it has a grid front, in order to prevent wads or possible hard unburnt grains of powder flying across the track to the injury of employés.

Whenever fog comes on the signalman has merely to insert the brass plug into the socket on the instrument in his cabin, and then so long as his signal remains at danger, and there are any cartridges left in the magazine, every train as it appoaches the signal will fire a shot. The noise made by the cartridge is so loud that no runner could possibly miss the warning.

The latest types now being developed by Mr. Fletcher have automatic indicators in the signalmen's cabins to tell them how many shots have been fired; and he is also designing magazines to contain 100 double shots (thus avoiding the least possible chance of a misfire), with an additional store of cartridges and self charging arrangements.

Prince's Muffled Safety Valve.

The illustration shows a muffled safety valve used on about 250 Philadelphia & Reading engines. It is of the old Richardson type, the muffler forming a shell in the valve, which is screwed up or down in the adjustment for different steam pressures. The muffler is a concentric annular shell, perforated with a series of small holes radial and opposite to each other. The steam in exhausting enters the annular shell from opposite sides.



Prince's Muffled Safety Valve.

This action further subdivides the jet, which then blows out upward in one body without noise. This valve is a very efficient muffler. It is simple in construction, and has been very successful on the Wootten engines. Mr. Samuel F. Prince, Jr., the inventor, is now superintendent of motive power of the Long Island road. He was formerly mechanical engineer of the Philadelphia & Reading.

The City and South London Electric Railroad.

BY W. H. BOOTH.

So far as regards mere electrical success this underground railroad can hardly be taken to be a failure, and electricians have, on the whole, very fair grounds for congratulating themselves. During the past week [March 26] there have been again some hitches in connection with the motors which have caused delay, but what of the delays on the London & Northwestern, the London, Chatham & Dover, or the Southeastern, etc.? Indeed, on some of the steam railroads out of London trains only seem to start in order that they may enjoy the privilege of stopping the more frequently, and delays of 10, 20 or even more minutes are mere nothings to the "Sir E. Watkin" element which controls these lines. The locomotive expenses of the subway, 7.88 pence per train mile are, on the whole, fairly moderate despite the very small engine power, and there is the striking fact, as shown in the last half year's report, that with more mileage the expenses have come down not merely per unit of work but are actually less in amount. This, perhaps, may be taken to prove that the generating station was much too large for its work and that when running at a higher power there is no increase in cost of working, but a decrease due to experience, etc.

It is unfortunate for the cause of electricity that the general public attribute the financial want of success to the electrical mode of traction, whereas this is not really responsible. It cannot be debited with the cost of elevators or the depth below surface which necessitates these. As a frequent user of the line I have noted a diminution in the number of gas lights employed to

light stations and an increase of the electric lights. The carriage lighting is better and the running is fast and good, and a few years ago the line would have been called perfect by any electrician. But of ventilating there is none worth speaking of, and the tunnel is now simply to be described as fetid. A certain amount of air does of course become changed at the stairways and elevators, and some of this change is due to the variations in pressure caused by the movement of trains, but this does not count for much in coping with the exhalations of some 15,500 passengers daily, the approximate number, which I calculate from the half year's total, making suitable allowance for season tickets and taking 180 days to the half year.

The question of air supply for deeply buried tunnels of this nature is systematically shirked and the subject is worth a little inquiry in order to really arrive at some idea as to what volume of air is really needed for healthful ventilation. On the assumption—which is, I believe, well inside the mark—that every passenger spends an average of 10 minutes per journey, we obtain the equivalent of 155,000 passenger minutes, or 2,583 passenger hours. In one hour the breath of one individual has been given as equal to a production of 20 litres of carbonic acid gas; that is fully .7 cu. . The passengers by the subway will therefore produce daily 1,820 cu. ft. of carbonic acid gas. To each train are attached four employés, and there are say 12 trains in operation. At each of the six stations we will assume four employés below ground (this will be well within the mark). We thus find a total of employés of 72 during 18 hours of the day, which gives us 1,300 man hours, practically a half of the passenger hours, so we may set down the total production of gas at, approximately, 3,000 ft. per day.

The total contents of the two tubes and the stations and approaches will not exceed 3,000,000 cubic ft., if it reaches that amount. Into this 3,000,000 ft. there are poured daily 3,000 ft. of carbonic acid, or 1 per 1,000; that is, one-tenth of one per cent.

Ordinarily good or normal surface air contains only four parts of this gas per 10,000, or .4 per 1,000. Hence as a result of a day's work, there will be present in the air of the tunnel 1.4 parts of carbonic acid per 1,000 of air, which is 3½ times the normal surface quantity on the supposition of there having been no change of air during the day; that is, an additional 2½ times the normal quantity is added during the 18 working hours of the day, which is equivalent to an addition of 14 per cent. per hour. This is a very serious figure—much more serious than people care to face or own up to, for it means than to merely maintain the tunnel in a state of only half the surface purity, or a proportion of .8 of CO_2 per 1,000, it is necessary to change something like four-sevenths of the whole air content of the subway every day.

Spread over 24 hours this is the equivalent of a 2½ per cent. ventilation per hour. Now, 2½ per cent. of 3,000,000 is 75,000 cu. ft. of pure air per hour, which represents the amount absolutely necessary to maintain only a 50 per cent. purity ratio, and this ratio is quite the outside healthful allowance. And it is far from likely that the 1,250 ft. of pure air per minute necessary to do this is in any way afforded by the present arrangement or no arrangement.

Apart from the carbonic acid constantly added there are various other impurities, ammonia and various hydrogens, etc., all of which need removal, and are answerable for much of the odor observable. The above figures, if rightly carried out, must be fairly representative of the actual facts, and I believe the factors are underestimated if anything. If a better than 50 per cent. purity be called for the ventilation must be at a very much higher rate. The 1,250 ft. necessary for the above ratio only means 250 ft. in each of the five sections of the tunnel and with an upcast shaft of 2 sq. ft. area a velocity of 2 ft. per second would give this ventilation. When brought down to the actual requirement of positive action the ventilating does not appear to present so terrible an aspect, but then no such appliance has been ever attempted and the whole question is begged by vague generalities about the piston action of trains, just as if the conditions of a deeply buried tunnel were identical with those of a shallow line. Every train in a shallow subway forces air out upon the surface, and before the train has passed this is swept away by the wind and fresh air is drawn in at the grids, as may be seen any day in London; but, at great depths the displacement to the surface can at most affect the upper parts of the stair cases and comparatively little fresh air gets so far as the tunnels.

With the enormous cost per mile of the subway it may well be a matter of surprise that some little expenditure could not be afforded for the very easy task of boring through the upper tertiaries to form a series of small shafts to the surface along the line of the tunnels. These would form self-acting ventilators all day for half the year or more, and for the whole year practically from sunset to sunrise they would act. The stairways would become down cast shafts, which they cannot now become in the absence of an upcast. Whatever method of ventilation be chosen for such a railroad, it appears certain that something ought to be done and that deep tunnels should not be left to the haphazard action for which too much has been claimed. The piston action of the trains would be amply sufficient if proper provision were made to utilize it by the use of such barriers as would obviate mere to and fro churning of the air which now takes place between the two tunnels. The methods adopted in coal mines often depend for success on very trivial barriers or stops to compel the air to travel in a certain direction. As compared with a coal mine, the ventilating of a railroad tunnel is a mere triviality, for the neglect of which there can be no excuse.

The American Railway Association.

The Spring meeting of this Association was held in New York City on Wednesday of this week, about 80 representatives being present. The date fixed for the Spring change of time-tables is May 15. The first business of the meeting was to listen to the address of President H. S. Haines, which will be found in another column.

The Secretary reported a considerable increase in the membership of the Association it being larger than ever before.

The Committee on Car Service made a report recommending the adoption for one year from July 1 next of half a cent a mile and six cents a day as the charge for freight cars interchanged, with auxiliary rules similar to those heretofore proposed in schemes for using a per diem rate. The committee proposed that line cars, which constitute the bulk of those which are held away from home in large numbers for grain or other special traffic, be exempted from the per diem charge, the half cent a mile to be the only compensation for these cars. It was recommended that the rate on private cars be reduced to half a cent a mile without per diem. A code of rules to prevent the misuse and diversion of freight cars was also proposed, embodying a penalty of $1 for each car diverted. The rates proposed by the committee are calculated, as has heretofore been stated in the *Railroad Gazette*, on the principle that a per diem charge is necessary and that to make it practicable the total amount (per diem and mileage) to be paid for a car should be about the same as under the existing system (¾ cent. a mile), and the 6 cents represents the difference (¼ cent a mile), on the average mileage per car per day, of all cars, which is estimated at 24 miles.

But the objections to any change are as strong as ever and the problem of reconciling the differences between borrowers and lenders is as difficult of solution as heretofore, and the Association voted to postpone action on the report until the next meeting.

The Committee on Train Rules made a report on the 24 hour notation, or "24 o'clock system," action on the subject having been requested by the American Society of Civil Engineers. Circulars have been sent out and replies received from over 100 members, but the committee does not find sufficient encouragement to propose any action. About 42,000 miles of road are in favor of the system as against 36,000 opposed, but some of the largest roads make unfavorable or conditional answers and only 16,000 miles are ready to adopt the system on Oct. 12, next, as was proposed.

This committee has received a large number of suggestions concerning the Standard Code, and has taken up the subject of interlocking and the block system, but it has not seen its way clear to make a report. The committee proposes that a special session of the Association be held in Chicago this summer to specially consider train rules, signals, etc. The Executive Committee will doubtless call the meeting as suggested by the committee. The subject of interlocking switches and signals and block systems are to be taken up by this committee and the Safety Appliances Committee, acting together.

The Committee on Safety Appliances made a report on Power Brakes. Circulars had been issued and were answered by 100 members, operating about 86,000 miles of road.

The committee recommended action by the Association according to the subjoined "conclusions," and the report was adopted, so that these rules or principles may be regarded as the standard of the Association. The paragraph of the report on this subject is as follows:

The best practice indicates—

1. That every truck wheel under each car in passenger train service should be braked.
2. That brakes should be so arranged that they can be applied not only from the locomotive but from each car in the train.
3. That the conductor's valve should be within control throughout the length of the car.
4. That the conductor's valve should be self-closing.

(NOTE.—The committee is not unanimous in this matter. The general practice to-day provides self-closing valves, and this is regarded as satisfactory by the majority of the roads replying to the circular.)

5. That 90 per cent. of the total empty weight of a car in passenger service should be used in estimating the braking power, and 70 per cent. of the total empty weight of a freight car.
6. That locomotives for each description of service should be equipped with power brakes applied to every wheel of both locomotive and tender, save the locomotive truck wheels, whether the cars of the train are equipped with power brakes or not.
7. That all cars on freight trains should be equipped with power brakes, and that the power brakes on all the cars of the train should be made use of.
8. That the driving-wheel brakes should be used habitually, and both locomotive and train brakes controlled by a single simultaneous motion of the engineer.

The use of the Westinghouse air brake largely predominates. The committee therefore regard it as exceedingly important if not essential that any other system used should be interchangeable and equally efficient in all respects with the Westinghouse system.

The committee earnestly recommends that all locomotives hereafter constructed should be equipped with power brakes applied to every wheel except the truck wheels of the engine itself.

The committee also submitted the following statement made up from replies to a circular sent out. The roads reporting are substantially the same as those reporting on power brakes.

FREIGHT CARS IN SERVICE FITTED WITH M. C. B. TYPE AUTOMATIC CAR COUPLERS.

	100 roads.	21 transportation cos	Total No. cars.
Jan. 1, 1887	6,341	78	6,419
" 1888	9,961	1,188	11,160
" 1889	20,070	2,322	22,392
" 1890	42,019	6,234	48,253
" 1891	76,548	8,948	85,496
" 1892	118,406	16,678	135,084
Since Jan. 1, 1892	1,793	25	1,818
Additional cars under construction or contract Feb. 15, 1892	25,035	1,574	26,609

The tabular statement of the replies to the brake circular shows some facts of interest. Six roads deem it unnecessary to brake every wheel of a six-wheeled truck under a passenger car. Connecting the conductor's brake valve in passenger cars to a cord running the whole length of the car is approved by 77 roads and disapproved by 18. Sixty roads, owning 12,000 cars, would have the conductor's brake valve self-closing; 29, with 6,000 cars, would not. Roads owning 11,000 passenger cars would make the brake power 90 per cent. of the empty weight, but 10 roads advocate 80 per cent. and 8 70 per cent., and several other percentages appear in the replies. It seems that there are 237 passenger engines in the country without power brakes. Approximately four-fifths of the passenger engines reported have driver brakes.

Ninety-eight out of 99 roads replying deem it desirable to have a power brake on freight engines, even if there is no power brake on the train. Of 13,000 freight engines reported 10,000 are equipped with power brakes, but apparently only 6,300 of these have brakes on the drivers. Ninety-six roads report 772,165 freight cars, of which 91,914 have power brakes. Eighty-nine of the 96 roads replying advocate using the driving-wheel brake habitually, and 83 of them say that this brake and the train brake should be operated by the same lever.

The election of officers resulted as follows:

President, H. S. Haines, Plant System; First Vice-President, Lucius Tuttle, New York, New Haven & Hartford; Second Vice-President, E. B. Thomas, New York, Lake Erie & Western. Executive Committee—H. F. Royce, Chicago, Rock Island & Pacific; Joseph Ramsey, Jr., Cleveland, Cincinnati, Chicago & St. Louis. Members of Committee on Train Rules—New York, Lake Erie & Western; Minneapolis & St. Louis; West Shore.

Experience with the Lentz Boiler.

It will be remembered that the firebox of the Lentz stayless locomotive boiler consists of a corrugated flue about four feet in diameter, which is divided by a fire-brick bridge-wall into a space containing the grate and ash-pit, and a combustion chamber. In a recent number of Glaser's *Annalen* a brief account is given of some observations made upon a freight locomotive built upon this plan for a German railroad and upon an ordinary freight locomotive under similar conditions. The combustion chamber of the Lentz locomotive is about 27.5 inches long and the tubes are nine feet two inches long. The exhaust nozzle was increased from 4.4 to 4.6 inches in diameter as the blast was found to be too strong. Also, as an analysis of the waste gases showed an excess of oxygen, the air passages which were provided in the bridge-wall were closed up and also the openings in the furnace door. In spite of this, the furnace door had to be opened frequently even at high speed to keep the pressure down. A deflecting plate was used in the smokebox. The average temperature in the smokebox was found to be 708 degrees F. with a load, at high speed, whereas the temperature in the smokebox of the ordinary locomotive was 526 degrees F. Analyses of the waste gases showed that the combustion was practically complete in the Lentz boiler. The conclusions drawn are that while the Lentz boiler gives complete combustion, the temperature of the escaping gases is so much higher than with the ordinary locomotive, that the former has no advantage over the latter. An improvement would be made by increasing the length of the tubes when practicable. Unfortunately no figures are given as to the rate of combustion and water evaporated.

New Steel Boat for the Upper Lake Trade.

The Canadian Steel Barge Co. is having a new boat built at Toronto for the upper lake trade. The boat is a steel steamer of the monitor type, and will engage in the grain and coal trade between Kingston, Ont., and the upper lake ports. The keel is 225 ft. and the full Welland canal size, with a 38 ft. beam and a hold of 20 ft. She is fitted with compound engines, and is expected to have a speed of 13 knots on a consumption of 1,000 lbs. of coal an hour. The new boat will register about 850 tons and will have a carrying capacity of 2,200 tons on 15 ft. draft of water.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The convention of the American Railway Association, reported in another column, was profitable, and marks progress, but does not afford much startling news. Colonel Haines' address is referred to below. Aside from that, the most interesting point is the promise of a special meeting, probably to be held at Chicago, to discuss train rules and signaling. The two committees in charge of these subjects are to work together, and the character of the men composing them is a warrant that this important field, so much in need of cultivation, will be attended to as thoroughly as the limitations of the association and the nature of the problems will admit of. The Car Service Committee has done everything that a committee can do, but the per diem reform still sticks. It is evident that the roads must first find out—on scientific principles and in detail, instead of by a mere glance at balances—how a thoroughly equitable system would affect them, individually, and then honestly stir up their consciences until they have the courage to adopt such a system. The most persistent and troublesome opposition—we do not say the *most* opposition—comes from those roads which enjoy undue advantages by reason of the inequalities of the present system. The report of the Safety Appliances Committee demands more attention than we can now give to it. Much of its report consists of common-place and details, but they are interesting details. The most important feature of its special topic—the problem of using air-brakes on long freight trains—is left practically untouched; though the fact appears that a considerable number of managers are in favor of avoiding the issue as long as possible by using only enough of the braked cars—even when the whole train is equipped—to conveniently control the train.

The address of Colonel Haines, President of the American Railway Association, at the meeting of that body on Wednesday, embodied an admirable resumé of what the Master Car Builders' Association has done, and what other bodies have *tried* to do, toward securing a uniform automatic freight car coupler for the railroads of the United States. No one else has made this summary in so clear and comp'ete a fashion. It furnishes the strongest kind of support for the argument which follows, and it is much to be desired that every Congressman and voter shall read the address. We regret that we have not the space to print it in full, though railroad officers may be assured that the portion which we give includes the essential part, so far as they are concerned. Col. Haines brings out the important arguments against compulsory legislation in a very effective manner (except that he treats very briefly one of the most important—that a law would almost surely be put, for administration, in the hands of men very poorly qualified for the duty); but the main point now needing emphasis—that legislation enacted for the purpose of forcing the poor or dilatory roads to keep up with the larger roads in introducing the Master Car Builders' Coupler will prove to be either unnecessary or ineffective—was, unfortunately, not made any more prominent than the others, on many of which his opponents are now in a measure convinced. This argument about hurrying the slow roads is really the most seductive one now presented in favor of a law, for that feature has the appearance of being the most harmless of any in the proposed bills, and its weakness should therefore be made clear to every doubter. The power of the larger roads to induce a small one to follow them in such a matter as car couplers is really very effective and far reaching, but it is likely that many legislators and others fail to appreciate the fact. If the great variety of questions on which the position of railroad managers is "We will do as our connections do" were to be explained so as to be clearly apprehended by these Congressmen, there can be little doubt that their minds would be greatly illuminated on this point. It is also to be remembered that people who can be led but not driven are found as frequently among railroad managers as in other kinds of business. We have abundant illustrations from experience that railroads will often accede to the requests of their connections for the sake of uniformity, even when there is good justification for continuing to stand out. On the other hand, it takes but little foresight to see that a compulsory law would at once be contested in the courts by some one, and such a contest, even if made by only one company, would suffice to at least prevent progress if it did not actually produce confusion. The Atchison, Topeka & Santa Fe is the most prominent advocate of a stand-still policy, and President Haines, in his argument before the Congressional Committee, declined to discuss the attitude of that road because it is not a member of the Association which he represents; but it seems clear, in view of the semi-isolated position of that road, and of the fact that progress in the adoption of the M. C. B. coupler east of the Missouri River has gone so far that there is no likelihood whatever of its being stopped, that it is better to refrain from disturbing the actual and rapid progress which we are already assured of, than to attempt to extend the scope of this progress by means which are of doubtful practicability. A press dispatch from Washington this week states that a resolution will be presented in the Senate which, as described, will place this whole matter just where the most intelligent and conservative experts have all along desired to place it. The resolution simply provides for full publicity, by means of annual statistics of brakes and couplers, to be published by the Interstate Commerce Commission; and the author evidently intends that the passage of this resolution shall kill off all pending bills. How strong a sentiment he has back of him we do not know.

Laminations in Steel Fireboxes.

One of the claims made for steel fireboxes at the time they were first introduced was that laminations, so common and so troublesome with iron firebox sheets, would be impossible. But in the light of experience the case is different, although many still believe that a lamination is impossible in a steel sheet. The new Baldwin compound built for the Master Mechanics' committee affords a marked illustration of the truth in this matter. That engine was built of the best material, so far as could be learned, and every care was taken in its construction; yet during the recent trials on the Burlington road it had to be sent to the repair shops several times to have a patch in the firebox caulked. The patch covered a lamination in the steel sheet. Blame for this does not rest with the locomotive builders, but solely with the plate makers. There is no known means of determining beyond question whether there is a lamination in a steel sheet or not. A lamination near the edge of a sheet may possibly be detected by etching the edge with acid, for then a lamination will show by a black mark; but if the fault be in the middle of the sheet, even a hammer test will not always show its presence. A hammer test is made by dividing the sheet off into small squares, and hammering each square separately, meantime listening to the sound and placing the fingers close to where the hammer strikes. If the lamination is such as to separate portions of the sheet, then the sound will be dull, and there will be a slight movement of the surface of the sheet, which can be distinguished by the touch at the time the hammer strikes.

Laminations are caused by several defects in manufacture. If the steel be poured in the ingot in such a way as to cause a "cold shut" or so as to permit air or gas bubbles to remain in what should be the solid part of the ingot, there will almost surely be laminations in the sheet when finished. If the top of the ingot be cut off too short, the defects present in that part of the ingot, such as bubbles and cinder, will almost surely cause laminations. The hammer process requires the utmost care. If the hammerer is careless and strikes the sheet unevenly, so that the hammer marks are not removed from the ingot, laminations are liable to result in sheets rolled from such improperly hammered ingots, as the edge of the hammer marks will roll over and form a film on the outside of the sheet. It may be stated almost as a self-evident proposition that if laminations do not exist when the sheet comes out of the rolls they will never occur afterward, even when the sheet is subjected to the severe heat of a locomotive firebox; so that the makers of steel sheets are directly responsible for laminations. These faults cannot be detected with any certainty by boiler makers.

As laminations give little or no trouble in a locomotive boiler, except in the firebox sheets, and as it is a question whether a lamination necessarily decreases the strength of the sheet, it is only the firebox sheets that need to be specially examined for this defect. The annoyance and delay resulting from lamination costs more than the sheet which gives the trouble, and the mere replacing of a firebox sheet does not remunerate a railroad company for the loss resulting from a lamination. Take the case of this Baldwin engine. It has a radial stay firebox and it will probably be necessary to remove that box in order to replace the defective sheet, and the cost will be several times the original price paid for the sheet. The committee on tests of iron and steel appointed by the last Master Mechanics' convention, has taken up the subject of laminations and will investigate it as fully as possible; but so far no method of determining whether a sheet is laminated has been found.

The Norfolk & Western

The Norfolk & Western Railroad, whose report for 1891 has recently been published, has a remarkably heavy freight traffic, equaled on no other entire railroad system south of the Potomac and the Ohio, and this although it has no great current of through traffic, nor an extraordinarily fertile country on its line, as for a great part of its length it passes between parallel mountain ranges. These, however, if they limit the territory from which traffic may be obtained, are to some extent defenses against its diversion by competing lines.

The great resources of the Norfolk & Western are coal and other minerals. These must be carried at low rates, but when there is enough of them they make a very handsome traffic, and the Norfolk & Western gets a great deal of them. It is also noticeable that while the mileage of the road has been doubled within the last four years, the traffic has about kept pace with the mileage. The freight traffic for the last seven years has been equivalent to a daily movement each way over the whole mileage of the following numbers of tons:

1885.	1886.	1887.	1888.	1889.	1890.	1891.
805	1,080	1,409	1,692	1,809	1,665	1,637

Meanwhile the average length worked has increased from 503 to 1,091 miles.

That this is a very respectable freight traffic may be judged by the fact that the Chicago, Burlington & Quincy, which has the reputation of doing a very good freight business, had a traffic last year equal to 468 tons each way daily—28 per cent. of the Norfolk & Western's. The Burlington, however, perhaps might select 1,091 miles out of its 5,285 which would have as dense a freight traffic as the Virginia road's.

The latter's passenger traffic is, however, comparatively light, being last year equal to the amount each way of 90 persons daily (75 on the Chicago, Burlington & Quincy, with its thousands of miles of branches in new country). The following comparisons with other railroads will make plainer, or make plain to more readers, the density of traffic on the Norfolk & Western. The figures for most of the others are based on the reports for the year ending June 30, 1890, to the Inter-State Commerce Commission:

	Traffic movement each way daily of— Passengers.	Tons.
Norfolk & Western	90	1,637
Richmond & Danville (east of Atlanta)	66	247
Chesapeake & Ohio (east of Huntington)	101	1,582
Atlantic Coast Line	68	222
East Tennessee, Virginia & Georgia	67	613
Louisville & Nashville (south of Ohio River)	137	811
Boston & Albany	709	1,417
New York Central & Hudson River	538	2,850
Pennsylvania	409	3,800
Baltimore & Ohio (east of Ohio River)	263	2,209

Probably few people in this part of the country were aware that the Norfolk & Western, down among the mountains (and there is still plenty of wilderness close to it) has a heavier freight traffic than the Boston & Albany (though its passenger traffic is but about one eighth as heavy). There may be some other surprises in the above, and we will warn the casual observer that the possession of a great mileage of branches is likely to bring down the averages of the railroads with the heaviest main line traffic. One of these surprises, we venture to say, will be furnished by the Richmond & Danville, whose freight traffic is not one-sixth as

heavy as that of the Norfolk & Western, so that on 2,541 miles it has little more than one third of the traffic carried over the 1,091 miles of the Norfolk & Western. The latter's freight traffic, however, does not quite equal the *average* of the railroads in the "Third Group" of the government statistics, that is, the territory west of Buffalo and Pittsburgh, east of Illinois, and north of the Ohio River.

The Norfolk & Western, like most roads with heavy traffic, has to accept low rates for freight. In every year since 1887 they have averaged less than 0.6 cent per ton per mile, and last year the average was but 0.584 cent. The New York Central last year was able to get 0 74 cent, and the Erie and the Pennsylvania average is more than this Southern road's. Nevertheless it makes money out of the business, for the average cost is less on the Norfolk & Western than almost any other railroad in the world, averaging 0.361 cent per ton-mile last year, and but 0.367 cent for the last five years. Compare this with the 0.57 cent reported on the New York Central last year, something more than 0.4 on the Pennsylvania usually and something more on the Michigan Central and the Lake Shore; which are among the lines usually showing the lowest cost. The cause of the exceptionally low cost on the Norfolk & Western appears in the statement that the average freight-train load was 329 tons.

More than seven-tenths of all the freight hauled on the Norfolk & Western last year was minerals, nearly half being coal and coke, and iron ore, pig iron and stone making large totals. Substantially all of this mineral traffic has grown up within the last 10 years. It amounted to 48,311 tons in 1882; to 4,154,884 tons in 1891, and it has nearly trebled since 1887. The other freight has increased greatly, but not to compare with the minerals. Thus since 1885 the mineral shipments have increased 3,470,000 tons (500 per cent.), the other freight 1,027,500 tons (200 per cent.).

The light passenger traffic is carried at comparatively high rates (2.938 cents per passenger mile), at a high cost, yet yielding a good profit, so that though there are 18 times as many ton-miles as passenger miles, the freight yields but 3½ times as much *net* earnings as the passengers.

The gross earnings of the Norfolk and Western last year were $8,422 per mile of road worked and the net earnings $2,913, the latter two-fifths more than those of the Chicago, Burlington & Quincy. The Norfolk & Western, however, has a very heavy capital account, the debt being at the rate of $47,747 per mile of road owned, the preferred stock, $35,714, and the common stock, $8,482, or $91 943 in all. The debt alone is equal to the average of both stock and bonds of the railroads of this country. After paying fixed charges it had a net income of $1,075 per mile of road owned, out of which it paid 3 per cent. on its preferred stock.

White Lights Dangerous for Signals.

The necessity of some better signal than a fixed "white" light for indicating "all clear" at night is set forth in another column to-day by a correspondent, who is an able superintendent on a first-class road. The same criticism has been mentioned to us by careful officers on other first-class roads. Neither to-day's correspondent nor any of the previous critics to which we refer are connected with the Chicago & Northwestern, which uses green for "all clear," so it cannot be said that they are merely recommending their own practices; but it *can* be said that the views referred to are not confined to narrow limits. And it is to be remarked in passing that our correspondent must have skipped his *Railroad Gazette* several times during the past year, as this subject has been discussed in these columns on a number of occasions, notably on Jan. 2, 1891, and May 8 of the same year.

Every one must start out, in discussing this question, with a full realization that at least 99 out of every 100 railroad officers interested are fully satisfied with present practice. Let well enough alone, is their argument. Railroads have been running for 50 years with color-blind engineers, and it is even now quite difficult to prove a single clear case of disaster resulting from that defect; why, therefore, bother about a still more speculative danger? But intelligent and far-sighted managers have come to see the wisdom of removing a color-blind engineman, even if he does have good luck in spite of his inability to tell whether a light is red, green or plain glass smoked; and they will some time come around to a similar position on this matter. A color-blind engineman cannot run according to the rules and make time with a fast train at night without "taking chances." Chances are taken in the same way by men not color-blind, on account of the uncertainties incident to the use of white for "all-clear." We will not say that this difficulty is as positively incurable as the other, for it is not; but the fact is admitted that chances *are* taken, and the plain duty of superintendents is to remove the excuse for such practice. No sensible manager really desires to trust to luck, even though "luck" favors him for a hundred years. The argument should therefore be kept up with the one man in a hundred who is not satisfied, with the hope of strengthening his convictions so that they will spread to other men.

The possible remoteness of the danger is to be fully admitted at the outset. It is claimed that no one knows of a collision in England resulting from the use of white, though white is practically universal there. But the English put signals on very tall posts, so that there is nothing but the stars to confuse the lights, and their distant signals are located far more distant from the point of danger than is the custom here. These two points largely explain why color is of small account there. Only a few cases of peril to a train because of the breakage of colored glasses have ever been heard of in this country; but are not those few enough to prove the danger?

The first point in our correspondent's letter was forcibly illustrated to the writer the other evening when he was looking out of the rear end of a train on a long tangent. It was just after sunset. A white signal light which had just been passed came for a few seconds directly in line with an electric street light which was probably 3,000 to 5,000 feet further off and a good deal higher in the air. It is true that the arc light was whiter than the signal light, and that, if a runner looked long enough, he would see that the relative position of the two lights changed as he moved; but we need not tell experienced superintendents that the excuse offered by a runner who should be deceived by that street light some night when the signal light happened to be unlit would have to be accepted much more promptly than most excuses are accepted.

But there are a good many changes in present practice to be made wherever green (or any color) is used for "all clear," and a variety of more or less troublesome problems will come up, even after a majority of the railroad officers interested shall have been convinced of the desirability of a change. The proposition that in fixed signals it would be better to use white for caution than to use it for "all clear," is based on a sound principle, but it would be found very difficult of application. If a hundred station or dwelling-house lights, which now are likely to be taken for safety signals, were to be changed to mean caution, it would only be changing a danger to a delay, and we want to remove both. Again, the light that is used for caution is needed for use on engines and cabooses, and white would be quite objectionable there. To get a new caution color, then, it is important, if not essential, to get one that will answer for classification signals and markers; which means that a color must be chosen which hundreds of railroad officers will not only approve of theoretically, but be able to substitute for green without inconvenience. This they would be very loath to do with white, because the change would be too radical. A classification signal on an engine really means danger, though its color is caution, so that the attempt to substitute white in the place of green for it would probably be unsuccessful. White light could readily be used as a caution signal on semaphores if it were made a form signal, which could be done by the use of two or three lights for each signal as is done on the Boston & Albany.

The introduction of a violet light on engines would not be hampered by any danger of its being read according to its former meaning, because it would have no former meaning. Violet is a distinctive color, as compared with red or green, to any person with normal vision, and no one afflicted with abnormal vision has any business with railroad signals. The trouble with violet is that it cannot be seen very far, and even though a runner may have no call to observe the signal from a distance he will naturally look toward it, as soon as he comes within range, and will be liable to mislead himself by noting other lights which appear near it. The very purpose of a distant signal is to obviate the necessity of looking far ahead; but enginemen *will* look far ahead in clear weather, and if a signal shows one thing at 2,000 ft. and another at 200 ft., that difference of indication will be offered sooner or later as an excuse for negligence.

Violet is also suitable, theoretically, for signal lights on engines. No reason exists for making the classification signals on an engine visible at any great distance. No one depending upon them for safety dares to be far away from the track when he expects the train on which he is to look for them. The wide-spread use of very dirty flags, of all colors, shows that color is not a vital element in such signals. But the fact that one signal light is visible at a distance where another is practically invisible would still make trouble.

This matter of classification signals is important, however, and affords a really strong argument for making use of three colors, for under the present practice the absence of a light means safety, whereas it ought to mean danger. Three kinds of lights are needed for signals on engines: one for a second section, one to indicate that the bearer is an extra, and one to indicate that the bearer is a regular train, carrying no signals. Violet, green and white, respectively, seem to be the most readily available for these uses. The exhibition of the train number on the face of the head light does not wholly remove the necessity for a white classification light, for as long as men must look for a light at a certain spot on the engine of every superior train that they encounter, it is essential that there shall always be a light there for them to see. The danger from the accidental extinguishment of a light is, indeed, under present practice, supposed to be provided against by the whistle signal, given by the engineman; but it is well known that there are some difficulties in the use of this whistle rule, and a good many officers believe it wrong in principle.

The weakness of both blue and violet lies chiefly in the fact, already mentioned, that at a long distance they are not so distinctive as is desirable, and this defect would be aggravated in practice by the fact that the green glass used in signal lamps is often of a bluish tinge; it being easier, as long as there is no color but red to guard against, to make a deep-colored glass by mixing some blue with the green. To use a third color it would first be important to see that the colors already in use were what their names indicate. A decided blue and a decided green, side by side, are easy enough to distinguish at any reasonable distance; but an engineman seeing either one alone, *at a long distance*, under circumstances favorable to a mistake, might call a blue light green; and this, if the latter color were used for "all clear," might prove a dangerous mistake. An engineman has no right to depend upon the reading of a signal which he makes a long time before he reaches it, but this condition must be considered, nevertheless.

We see therefore that blue is less desirable as a caution signal than some color which, if mistaken, will be mistaken for red—a mistake on the side of safety. Violet or purple, rightly combined with red, affords such a color; though the glass makers do not make such a combination now, so far as we can learn. That a signal which appears to indicate danger when first sighted, but which changes to "caution" as it is more closely approached, can be used with satisfactory results is evidenced by the experience of the Chicago & Northwestern, whose distant signals, described in the *Railroad Gazette* of May 8 last, have that effect. But even if violet is only partially satisfactory at best, the abandonment of effort at improvement is still unwarrantable, for the reason that a form signal is perfectly feasible for a distant signal, as the experience of the Boston & Albany for several years has proved. The greatest objection to the Boston & Albany signals is the expense, three lamps being required for each signal, but that is not very great when it affects nothing but distant signals.

The most marked need in this matter is to stop the practice of trusting to luck, "taking chances," which enginemen are so prone to indulge in, and which superintendents know is indulged in, more or less, by most of their men. This practice is dangerous *per se* and should be killed out, if possible, by any superintendent who desires peace of mind for himself, whether it results in an accident every year or only once in a century; but it is also dangerous in another way, which, though not susceptible of precise statement, may very well be worse than the direct evil: we mean the encouragement, by this quasi-compulsory chance-taking, of habits equally loose in other directions. An engineman who honestly believes that he is expected, if it is necessary in order to make time, to ignore the rule requiring him to approach certain points under control, is more than likely to ignore the same rule where his schedule does not demand it; and, the bars being down to that extent, to ignore still other rules, involving equally important matters. It is just such notions as these that lead to many minor collisions and other mishaps, and some serious ones. It is true that it is often hard to prove this theory in specific cases, but it is unnecessary for us to remind superintendents that they fully believe it, nevertheless.

The one emphasized clause in Ashbel Welch's report of 1866 on signals, which was recently referred to in these columns, is that which says that where there is great liability of such an obstruction as would cause serious disaster *safety signals should be used, and never*

danger signals. In other words a semaphore should have a light to show all-clear, but none to show danger. The principal trouble with Mr. Welch was that he was 30 or 40 years ahead of his time. Our practice has only partly caught up with this important principle, but it is likely to make further advances in the future and the demand we are here considering concerns an element which must be recognized as an important one if the desired progress is to be speedily accomplished. Even if we do not go so far as to throw away the danger light, it will be admitted that every possible means should be taken to discourage the habit among runners of regarding the absence of red as a conclusive indication of safety; and the best way to do that is to improve the efficiency of the all-clear signal. Men who hold that the unfavorable considerations outweigh the favorable, in the foregoing, will doubtlesss say that the accomplishment of this improvement involves the use of a *form*, both night and day, for distant signals and perhaps for signals on engines and cabooses, but that does not warrant dropping the problem. There is a demand for the further improvement, simplification and cheapening of form signals, and American signal engineers can doubtless meet it if they try.

Acceleration and Retardation of Suburban Trains.

A careful analysis of the movement of suburban trains will show that the power exerted by the locomotive is mainly used in getting the train into motion. The resistance resulting from the friction of the train is inconsiderable when compared to its inertia. Suburban work, like that on street railroads, consists in the continual starting and stopping of heavy bodies. The rate of acceleration is greatest with the cable, and probably least with horses. In Chicago the cable cars attain a speed of fifteen miles per hour in about 100 ft. when the grips are in good condition. Such a rate of acceleration causes great strains upon the cable, and when a number of trains are accelerating at the same time there is likely to be a broken cable. Acceleration by cable is so sudden as to sometimes throw passengers from their feet, and the rate of retardation is equally great, as the brake power is only limited by the adhesion of the wheels to the rail, and every pound of weight is made available for stopping a train. Generally a clutch brake

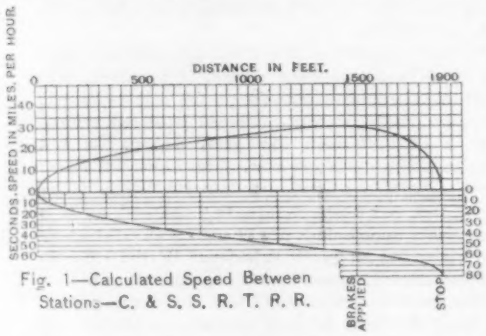

Fig. 1—Calculated Speed Between Stations—C. & S. S. R. T. R. R.

is used, and the brakeman merely closes the clutches against the discs. On electric railroads the rate of acceleration is considerably less than on cable roads. With a comparatively light load the electric motor will start a train perhaps as rapidly as a cable, but with the motor the danger of burning out the armature or a safety fuse has to be guarded against, as it causes delay.

In steam locomotive practice the rate of acceleration is very much less than with either electric or cable propulsion, and in suburban service where steam motors are used the great problem is to get a sufficiently high rate of acceleration to enable a quick average time to be made over the line. In New York City, on the elevated road, the average speed ranges from 10 to 12 miles an hour for regular accommodation trains. The difference in average speed is controlled by the number of stations per mile. The rate of retardation on the elevated road is not as great as on cable or electric street roads, for the reason that the braking force is limited to the light weight of the cars, just as it is on ordinary railroads, and there is danger of sliding the wheels by the use of powerful brakes, if the braking force exceeds the weight of the empty car on the wheels.

This question of acceleration and retardation has been one of the problems which the Chicago elevated road has had to solve. That road has to compete with a cable running 15 miles an hour. The three-car trains drawn by this cable at times run for a whole mile without stopping, thus giving a high average speed. On the street railroad stops are only made when there are passengers to get on or off, but on an elevated road all stations are stops. In Chicago the stations average about two and one a half mile, and it is necessary to have an average speed as great as 15 miles per hour in order to successfully compete with the cable. To accomplish this the engines have been made eight tons heavier than those used in New York City, and a powerful quick-acting brake has been adopted to increase the rate of retardation during a stop.

An examination of what has been done in Chicago in this way is interesting, and we give the accompanying diagrams showing how the calculations have been made to determine the possible average speed over the line between stations with a locomotive without working it too hard. Diagram fig. 1 shows the variation in speed between two stations and the time at the different points. The divisions above the zero line give the speed in miles per hour, and below the seconds in time. The points where the brakes are applied are marked at about 1,500 ft. It will be noticed that to run an engine in this way is to get the minimum time between stations, but the engine must be kept pulling out steadily until the brakes are applied, and the stop must be made in the shortest possible time. These curves were calculated by the engineers of the road from the mean effective pressures in the cylinders and indicator cards taken from similar engines during experiments on the Burlington road in 1887. The time curve was calculated from the same data. In order to show what the rate of acceleration will be with the new engines, a Boyer speed recorder has been constructed which will reel off one foot of paper for each mile of track. This recorder is in use on the new compound suburban engine on the Illinois Central, and diagram, fig. 2, taken on the Illinois Central, shows the variation in velocity between stations. The distance

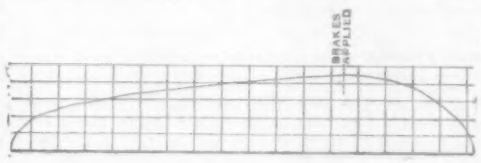

Fig. 2—Speed Record—Illinois Central Railroad.

between stations is not the same as on the elevated. In some cases it is more in others less; but from the shape of the curve it will be seen that it corresponds almost identically with the calculated curve and indicates several interesting facts: (1) That the method of calculation of the speed for diagram fig. 1, is correct. (2) That suburban trains are hauled by operating the engine continuously until the brakes are applied; (3) That the speed recorder will operate successfully when run at a speed which will reel off one foot of paper per mile.

It is noticeable that the actual rate of acceleration on the Illinois Central during the first 100 ft. is greater than the calculated. This is shown by the angularity of the line rather than by the divisions on the diagrams, as the divisions do not correspond in measurement. Diagrams like fig. 2 will be taken from the different engines on the elevated road to show the difference in operation by different engineers, and they will aid in showing why one engineer can make time over the line where another runs always behind.

Books on Railroading.

I.

Nothing is more significant of the increased importance of railroad matters in the public mind than the growth of a special literature of railroad economics. Such literature, in English, at least, is almost entirely a development of the last six years. Previous to that time there were good books on railroad law and railroad engineering; but they treated railroads rather as a branch of the business of the lawyer or engineer than as a separate matter by themselves. Books on railroading as such, independent of other professions, were very few in number. Charles Francis Adams was the only popular writer of books about railroad policy for the information of the general reader; while the one writer of books for railroad men themselves who had attracted much public attention was Marshall M. Kirkman. Today this has wholly changed. For railroad men and for the public alike, a large mass of literature has grown up, too great to be dealt with in the limits of a single article. In attempting to give a bibliography of the subject, we shall speak first of those which deal with roads from the operating standpoint; next of those which aim to help the economist or legislator, and finally, with reference books of general history.

On railroad operation, in the narrow sense, there is one elementary book of first-rate excellence: Charles Paine's "Elements of Railroading," New York, 1885 (the *Railroad Gazette*). Although written primarily for railroad men and not dealing ostensibly with problems of engineering or of economics, it is a book which needs to be studied by every man who would familiarize himself with railroad methods. A description of English railroad practice of somewhat similar importance is Findlay, "The Working and Management of an English Railway," London, 1890, Whitaker & Co. This book is wider in its scope than Paine's and takes up a number of business problems. It is interesting as furnishing an excellent means of comparing English practice with our own. Kirkman's books have been already alluded to and are too familiar to require special comment. They almost all deal with railroad expenses and receipts, and those matters where the financial and operating departments come in contact with our author. A book on the wider aspects of railroad economy, just issued by this author, will be discussed in a later article.

Of special treatises on the details of railroad operation, Forney's "Catechism of the Locomotive," New York (*Railroad Gazette*), deserves special mention. The first edition of this book was published in 1873, the last in 1890. This has perhaps been more widely read and used than any other book on railroad operation.

We have no space to mention the various works on engineering, like Trautwine's "Engineer's Pocketbook," Henck, Searles, Shunk, etc., which are in constant use by railroad men. Of works from the engineering standpoint, Wellington's "Economic Theory of Railway Location" is the most important, for it is alone. The first edition of this book was published by the *Railroad Gazette* in 1877. The second edition was largely remodeled, and was published by John Wiley & Sons and *Engineering News*. The book contains a vast amount of information, but is chiefly valuable in suggesting directions in which to investigate. In this way it is not only original but unique.

A good summary of the leading points of Wellington's "Theory," in compact form, is to be found in Godwin, "Railroad Engineer's Field Book," New York, John Wiley & Sons, 1890.

These books deal with location rather than with railroad operation. The application of sound principles to cost of transportation has gone on but slowly. A promising beginning was made in 1874 and 1875, in a series of pamphlets, of which the most important were:

L. E. Morehouse, "Cost of Transportion on Railroads;" A. Fink, "Cost of Railroad Transportation," and O. Chanute, "Elements of Cost of Railroad Freight Traffic." Mr. Fink's analysis was republished in 1882, and Mr. Chanute's in 1885. That of Mr. Morehouse, a paper read before the Civil Engineers' Club of the Northwest in 1874, which was in many respects the most useful of the three, is now out of print. Most of the detailed figures on which Morehouse worked have been radically changed by the substitution of steel rails for iron, and the increase of loads and locomotive weights, but the general method of analysis is applicable to-day as it was 18 years ago, and is far more valuable than the crude attempts to calculate ton-mile or passenger-mile cost which form the staple of various statistical reports at the present day.

English analysis of cost of transportation is decidedly less developed than American. Since the work of Dr. Lardner, "Railway Economy in Europe and America," nearly half a century ago, very little has been done. The English railroads object to publishing statistics of train miles or passenger miles. Their train loads, and even their average length of haul, can only be made matters of guesswork. J. S. Jeans' "Railway Problems," London, 1887, Longmans, Green & Co., is of very little use, its figures being neither trustworthy in themselves nor correctly used. The best criticism of English practice, though written from a somewhat one-sided standpoint, is E. B. Dorsey, "English and American Railroads Compared," New York, John Wiley & Sons, 1887. In French and German the literature on this subject is much more copious. As early as 1839, Marc Seguin published a work on railroads, in which modern developments have been anticipated with surprising correctness.

In the application of engineering methods to traffic problems, we may mention the names of De la Gournerie in France, and Launhardt and Von Nördling in Germany. The discussions of these matters in the *Archiv für Eisenbahnwesen* have been of decided value, although American readers would probably think that the matter was drawn out a good deal too fine. The same general criticism may perhaps be applied to the discussions on cost of transportation in the *Annales des Ponts et Chaussées* (Paris). On track construction itself Haarmann, "*Das Eisenbahngeleise*," with more than 1,800 beautiful engravings, is a superb work. But to enumerate simply the titles of the German and French *technical* railroad books would fill columns.

A bill has been introduced in the lower house of Congress by Mr. Bingham, of Pennsylvania, providing that it shall be unlawful for common carriers, their officers or agents, to pay or allow, directly or inditrectly, to any common carrier, any commission or thing of value in the nature of compensation upon the sale of passenger tickets, or for procuring or influencing passenger transportation. It is made unlawful for common carriers to pay or allow any commission, bonus, salary, or valuable consideration whatsoever to secure the forwarding of immigrants by any particular route, or to procure the shipment of immigrants from foreign countries. This seems to be aimed at the commissions paid by the railroad companies to the steamship companies at New York. It is all right if any one can enforce it, for the payment of commissions to the steamship lines is even more indefensible than similar payments to individual ticket sellers; but the effect of the law will probably be about like that of the compulsory heating and coupler laws that have been passed here and there; it will indicate what the law *would* do if it could.

One of the most useful volumes issued by Mr. Francis A. Walker as Superintendent of the Census of 1880, was that on wages in the manufacturing industries, compiled by Mr. Weeks, the editor of the *American Manufacturer*. Superintendent Walker says that it is believed that this report constitute "the largest magazine of statistics relating to the wages of labor to be found in any single publication," and this "collection of statistical data relating to the wages of labor in the United States is believed to have been as thoroughly tested and as carefully purged as it is reasonable to expect in the case of any statistical

work whatsoever." A bill is now before Congress providing for a continuation of the statistics, to include 1890, on the same lines as those adopted in volume XX. of the last census, and it is understood that Mr. Weeks, whose work proved so satisfactory to students of such questions, will have charge of the continuation. As our legislators of all political persuasions seem desirous to have the work continued, it is hoped that the bill will be speedily enacted, so that the volume will be given to the public before 1896.

NEW PUBLICATIONS.

Irrigation Canals and Other Irrigation Works, including the flow of water in irrigation canals and open and closed channels generally, with tables simplifying and facilitating the application of the formulæ of Kutter, D'Arcy and Bazin. By P. J. Flynn, C. E. San Francisco. 1892. Large 8vo., pp. 398 and 283.

This book is the most complete treatise extant on irrigation, and will prove of great value to all engineers who are interested in the design or construction of works for irrigation, and also to all hydraulic engineers who have to deal with the flow of water in channels.

The author has had a very extended experience in California in the construction and management of irrigation works, a branch of the profession in which little or nothing has been done east of the Rocky Mountains. In preparing himself for this work he has evidently studied the great irrigation works of India, and has corresponded with the engineers who have had those works in charge, and has embodied in his discussion of the subject the experience of most of the works of this class in Asia, Africa and Southern Europe.

The subject matter is logically arranged, concisely yet clearly presented, and the book is gotten up in excellent style both as regards size, typography and illustrations. It is also satisfactory to note that Mr. Flynn has taken care to give due the credit to all of the sources whence he has drawn his information.

The second part of the book will be found very valuable for constant use and reference by engineers who have to deal with the flow of water in pipes, conduits and channels, provided that the numerous tables given are typograpically correct. No errors are discoverable on a casual inspection, but it will be very strange if in the immense mass of figures given in these tables some errors should not be found.

In one or two points it is probable that the author will be disposed to make some changes when a second edition of the work may be issued. In a book of reference of this kind, it is very desirable that the unit of reference for the various measurements and quantities should be the same throughout the book. The author's idea with reference to the standard unit seems to have varied at different times during the composition and arrangement of his great work. Thus in some of the earlier tabular statements and formulæ the slope of the surface of waters in channels is given in inches per mile, and curiously enough the first table in which this unit is used is calculated by a formula in which the slope is given in feet per mile. After using this notation for some 30 pages, the notation of slopes is changed to the distance in which the surface falls one foot, such as one in 4,442, one in 10,560, etc. Then after a few pages we find that some of the slopes are in feet per mile. This intermingling of units is rather confusing, as is also the fact that while the unit of capacity is generally assumed as the cubic foot, in one table the discharge of several rivers is given in cubic miles.

TRADE CATALOGUES.

Bryant Metal Sawing Machine.—The Q. & C. Co., of Chicago and New York, has issued a neat and well arranged illustrated catalogue of the Bryant rail saw, which is already well known to our readers. This saw is used by bridge builders, rolling mills and various establishments other than railroads, and its adaptibility to each use is clearly set forth. It was described and illustrated in the *Railroad Gazette* of Dec. 11 last.

Japanese Railroads.

The following letter from Mr. R. S. Gardiner, President of the *Pathfinder Guide*, and now sojourning in Japan, is printed in the last issue of that publication:

The railway system of Japan now being operated covers 1,845½ miles, 1,156½ of which is owned by stock companies or individuals and 689 by the Imperial Government, the latter being known as the Imperial Government Railway. The first road opened to traffic was that between Yokohama and Tokio, the capital, 18 miles, in 1872, although it may truly be said that Commodore Perry built the first railway in 1853, when he landed an American locomotive, sent as a present to the Emperor by the United States Government, and built a short piece of track to show its working to the astonished natives.

All the railways in Japan are narrow gauge, 3 ft. 6 in., and almost without exception the rolling stock and motive power are of English build. The usual passenger train on the larger lines consists of say three third-class cars, two second-class, and one first-class—the third-class cars being about 30 ft. long, with wooden seats placed similarly to cars in America. They are always crowded, for in Japan, as in our Southern states, the poorer the laborer is, the more he looks upon a railway trip as a holiday. The second-class cars are about the same length as the third, but the seats are either of cane or plainly upholstered leather. The well-to-do Japanese patronize these cars, as indeed do many foreigners when traveling without ladies. The first-class cars are from 18 to 22 ft. long, divided into two or three compartments, entered from side doors, as, indeed, is the case with cars of whatever class. The first-class are only used by Japanese of the aristocratic grade, and by foreigners who are willing to pay for the best there is, regardless of cost, which, however, is only three cents a mile for first-class, two cents for second and one cent for third. These rates are fixed by government and cannot be exceeded, either on the Imperial or the private lines, although a less rate may be charged by the latter.

The government, at the inception of the lines, found it necessary to employ foreign talent, so that five years ago about 100 heads of departments were Englishmen or Germans, but as soon as Japanese could be educated to do the work the foreigner was dispensed with, and now the whole number of foreigners employed can be counted on one's fingers.

The shops are located in Tokio, and I was permitted to inspect them; some 1,500 hands are employed. The average pay of first-class mechanics is 50 cents a day, while foremen or assistant foremen get the princely remuneration of 90 cents per day; and this, in Japanese money, a dollar of which is worth about 75 cents in gold. Locomotive engineers receive about 90 cents a day, train conductors (guards) 60 to 80 cents, and brakemen and porters 15 to 20 cents a day, and yet such a thing as a "strike" or even a "kick" is unknown, for the man who has a steady situation here and earns 50 to 90 cents a day is regarded as a very lucky fellow.

The roadbeds of all lines over which I have passed are good. The right of way is nearly always fenced, and road, ditches and space to fences kept scrupulously clean. Well constructed iron bridges cross all streams, and culverts, tunnels and crossings under highways are of masonry, of solid construction and ornate design.

. . . On the through or long lines, 25 miles an hour, making stops, is the average for passenger trains, although I have timed 50 miles an hour when running between stations. Owing to the fact that very few four-wheel trucks are found beneath cars, the riding cannot be said to be smooth. The method of ticketing is similar to ours, the small card local ticket, each class of a different color, being printed in both English and Japanese. Upon entering a station gate, the passenger must present his ticket to the gate keeper for punching, and again when he alights at his destination he must pass through an exit gate where his ticket is surrendered. The American style of brass baggage check is used, with the difference that the destination of the baggage is printed on a paper, and this is pasted around the strap. Water closets are conveniently located at every station; at the same time, all, or nearly all, first-class carriages contain a small closet and toilet room, scrupulously clean and with modern appliances. Sleeping cars are unknown.

English engines of 30 and 35 tons are used on all roads, the marked exception being two Baldwin engines, now in use on the Imperial road. These, I should judge, were bought under protest, for it seems to be the aim of the authorities, or rather the English master mechanic, to prove that they do not equal his national machine, for I examined tables showing that drawing equal loads upon grades, some of which are 1:32 ft. to the mile, the American machines use 85 to 90 pounds of coal to the mile, against 55 to 60 pounds used by the English engine. I am not prepared to base a corroborative conclusion upon these alleged results, because the wish to have them so is too apparent. The evident intention of the Japanese authorities is to displace the few foreign officials now in their roads as fast as their own people are educated to the duties, and until that time arrives the American engine builder will get no show here.

There are now some four or five hundred miles under construction, mostly private lines, and if our American builders could succeed in placing their engines on these new lines—conditional upon competitive tests being made with American engineers in the cab, a foothold might be gained, for the Japanese is favorable to the American, and I believe intends to be just, but while controlled immediately by English superiors, I rather think he meets their views in his own interests.

TECHNICAL.

Manufacturing and Business.

Mr. J. E. Greensmith has been appointed General Manager of the Portland Locomotive Works, Portland, Me.

At the annual meeting of stockholders of the Continuous Rail Joint Co. of America, at Newark, N. J., April 6, the following named directors were elected for the ensuing year: Theodore Frelinghuysen, Robert Gray, Jr., Abraham W. Thompson, Frederick T. Fearey and Fernando C. Runyon.

New Stations and Shops.

The Ohio River Railroad has definitely decided to build a passenger station at Huntington, W. Va., at the foot of Eleventh street and the freight house at the foot of Twelfth street. The estimated cost of the passenger station is $8,000.

The Baltimore & Ohio has let the contract for a new passenger station at Glendale, between Benwood Junction and Moundsville, W. Va.

Bruce & Morgan, architects, of Atlanta, will receive proposals until April 25 for the erection of the union station at Albany, Ga., lately noted.

The Louisville & Nashville has prepared plans and specifications for the union station at Montgomery, Ala. A two-story brick and stone station and large car shed and freight house are contemplated. The estimated cost is placed at $250,000.

Car Shops Burned.

The Nicetown repair shops of the Philadelphia & Reading at Wayne Junction, near Philadelphia, were destroyed by fire on the night of April 9. The loss is about $44,000, including about 80 box cars which were destroyed in the fire. The shops are to be rebuilt immediately.

Need of Care in the Use of Phosphorus.

Since the introduction of phosphor bronze for bearings and boxes several shops have had trouble with the effect of the phosphorus on other materials when heated in a furnace where phosphor bronze has been heated or melted. Phosphorus is an evil metal to have around furnaces, particularly in a smith shop. A piece of phosphor bronze in a tool fire will ruin steel tools heated in the same furnace. Not long since some phosphor bronze boxes had been melted in the same furnace where steel plates were heated either for annealing or for flanging. The steel was found, after heating, to be brittle, and it behaved precisely as if high in phosphorus. Analysis showed that phosphorus had been absorbed from the furnace. To further prove the matter, sheets that were known to be good were heated in the furnace and were afterward found to be unfit for use.

Transportation of Coal Through a Pipe Line.

President Wallace Andrews, of the New York Steam Company, has patented a plan for carrying coal from the coal fields of Pennsylvania to the seaboard through pipes, for which he claims great advantages. The plan is simply to grind the coal to a fine powder, then to mix it with water in equal parts, and then to pump the mixture through pipe lines precisely like those now used for petroleum, to its final destination. James Means & Co., of Steubenville, O., are constructing a dry pan which will be placed on exhibition in New York City. The purpose of the inventor is to grind coal in the Connellsville coke regions, and force it through pipes to New York City, where it will be allowed to settle in vats and a large proportion of the water drained out. It will then be pressed into bricks and used for fuel. It is proposed to force it through the pipes at the rate of five miles per hour. The company has the process on a small scale in operation at 59th street, New York City, with the exception of the pulverizing process, which will be complete as soon as the pan arrives. It is proposed, in connection with the comminuting process, to wash the coal so as to remove sulphur, slate, etc. Mr. Andrews claims to have pumped coal "mush" 3,000 (300?) miles at five miles an hour, and says that a 12-inch pipe will deliver 5,000 tons of coal a day.

The Sykes Signal Patents.

Judge Acheson, of the Circuit Court of Appeals, decided at Pittsburgh, this week, on final hearing, on the question of title to the Sykes patents, that the Union Switch & Signal Co. never obtained and has now no title, but that the title is in the Johnson Railroad Signal Co.

Mannesmann Steel Tubes as Water Pipes.

The interest with which steel pipes for water-carrying purposes have been regarded for the past few years by water-works men makes the recent application of Mannesmann steel tubes in this field specially noteworthy.

One of the important advantages claimed for the Mannesmann tubes over other steel tubes as water carriers is that they can be made of comparatively hard, and consequently high-carbon, steel, and are thus much less subject to corrosion than the mild steel which must be used for welded tubes, according to the generally practiced method of pipe making. The Mannesmann tubes, moreover, in virtue of the peculiar process followed in making them, are seamless and are turned out at a comparatively low temperature, in fact, much below a welding heat. The pipe surfaces, accordingly, are claimed to be very smooth and close in texture—features which probably add to the freedom of the pipes from rapid corrosion.

Elasticity and great resisting power against the strains set up by expansion and contraction, due to variations of temperature, and against shock, such as from water hammer, are further counted up as advantages of the Mannesmann pipes. The latter, as put on the market by the Mannesmann Tube Works, at Düsseldorf, Germany, are furnished with a protective coating of tar, but in special cases, if there be need, they are galvanized or otherwise coated to satisfy particular requirements.

THE SCRAP HEAP.

Notes.

John Boyd, the North Carolina train wrecker, who escaped from jail, has been recaptured.

The New York Central & Hudson River Railroad is to adopt the duplicate order system in train dispatching on the first of May.

A St. Louis dispatch of April 6 says that the Southern Express Co. has discharged 90 messengers for being members of a brotherhood. The Pacific and the United States express companies are also said to have discharged a number of messengers.

The New York Supreme Court has granted the application of the New York City Rapid Transit Commissioners for a commission of three to determine whether or not a road shall be built on the line laid out by the commissioners; but the members of the special commission have not yet been named.

A Canadian paper states that great difficulty is found in keeping brakemen at work on the trains which run through the St. Clair Tunnel, the discomfort from the accumulation of coal gas being so great that the men, although paid high wages, generally give up their places in a few days.

The iron bridge of the Pennsylvania Railroad at the crossing of the Juniata River, near Union Furnace, Pa., was wrecked on the morning of April 11 by an excessive blast of dynamite used in breaking up a ledge near by for the straightening of the road. Through trains had to be run by way of Williamsport for a day.

A severe and widespread rain storm did a good deal of damage in northern Mississippi last week, a considerable number of people being drowned in the region of West Point. It was reported on April 8 that five bridges on the Georgia Pacific had been destroyed by the floods. The train service of the Louisville & Nashville was very seriously interrupted, long stretches of track being under water for several days. The Illinois Central suffered seriously. There were also a large number of washouts at the same time in the region of Rome, Ga. High water in the Des Moines River swept away one span of a new $75,-

000 bridge, in course of construction at Ottumwa, Ia. Seven workmen were swept into the river, but were all rescued. The bridge across the Becancour River, at Becancour, Quebec, was carried away by the ice on the night of April 6.

World's Fair Notes.

Last week the bids were opened for furnishing 87,096 lamps for the World's Fair grounds. The bidders were Thomson-Houston, Edison, Brush, Fort Wayne Jenney, the South Side Machine and Metal Work companies and others. Thomson-Houston bid $18.51 per lamp. The Edison was 2 cents lower. The South Side Company's bid was $6 60.

On Tuesday of last week a miniature cyclone swept over the grounds, and caused a damage of $30,000 to the various structures. The greatest damage was done to the Illinois State building, the dome of which was blown down, and a brick power house in process of construction was also razed to the ground. The remaining buildings, all in the process of construction, withstood the heavy wind without any evidence of weakness.

Spanish American Notes.

The Sao Paulo Railway, Brazil, has put on a fast express train between the cities of Sao Paulo and Santos.

The Argentine National Railroad Board has limited the Argentine Northeastern Railroad to six months for the completion of its main line and to two years for the completion of the branch line. This road lies entirely on the east side of the Rio Paraná, connecting Monte Caseres with Corrientes. The total length of the main line and branch will be 512 miles.

During the past season 200 ocean vessels have become infected with yellow fever in Brazilian ports. In some cases the majority of the crew being stricken with the disease, the remainder fled, leaving the ship deserted. The loss to commerce in Brazil on account of the fever has amounted to several hundred thousand dollars during the last six months, and yet no precautions were taken to check the epidemic.

The Central and South American Cable Co., of New York, having recently acquired the trans-Andine telegraph line from Valparaiso to Buenos Ayres, is now seeking to extend its system up the east coast of South America. To this end it has applied to the Brazilian government for a charter to lay a cable from Buenos Ayres to Rio de Janeiro, touching at intermediate points. The English and French cable companies, having held exclusive control of this coast for many years, are making a vigorous opposition to this entrance of an American rival into their territory.

The government of Bolivia has invited proposals for the construction of a narrow gauge railroad from Oruro to La Paz, a distance of about 125 miles. The bids will be opened July 1. The construction company will have to furnish the capital, upon which an interest guarantee will be given by the Bolivian government. Lands for right of way, stations, yards, shops, etc., will be given free, and all materials of construction and necessary plant will be admitted free of duty. There is no reason why this should not be a paying enterprise, even without any guarantee of interest, as it would afford an outlet for a rich region which already has a large commerce. The Antofagasta-Bolivia Railroad is now completed to within 60 miles of Oruro, and will reach that city during the current year, and this new road would be practically a continuation of that paying line. The commerce of La Paz at present goes by way of cart roads to Lake Titicaca, and thence uses the Southern Railroad of Peru to the coast. Parties desiring to build a railroad to Puno on Lake Titicaca are unable to proceed because of their inability to make suitable arrangements with the Peruvian Corporation, which controls the Southern Railroad, and the Peruvian Corporation, on the other hand, has failed to secure such a concession by reason of its unwillingness to concede to the natural demands of Bolivia. The resulting deadlock would prove an immediate advantage to a road from La Paz to Oruro. This line, furthermore, would form a link in the chain of roads to Atlantic tidewater in Argentine as soon as the Central Northern Argentine extension, now building, shall have reached Huanchaca, Bolivia.

Canadian Railroad Returns.

The Canadian Minister of Railways and Canals laid his annual report before Parliament last week. The report shows that up to June 30, 1890, the mileage of railroads including the Government roads completed was 14,004 (besides 1,679 miles of sidings), and 13,256 miles of road in actual operation. The paid up capital amounted to $786,447,811. The gross earnings of these roads amounted to $46,843,826, and operating expenses to $32,913,350, leaving the amount of the net earnings $13,930,476. The number of passengers carried was 12,821,262, and 20,787,469 tons of freight were conveyed over these roads. The total number of miles run by the trains was 41,849,329. During the year the following new lines were built by the Government and were opened for traffic: Oxford Junction, to Brown's Point and Pugwash, 72½ miles, opened July 15, 1890, and the Cape Breton Railway, of which the portion from Point Tupper to Grand Narrows, 46 miles, was put under traffic on Jan. 1, 1891, and the portion from Grand Narrows to Sydney and North Sydney, and connection with the International Coal Company's line at Sydney, 52½ miles, was opened on Nov. 24, 1890. In operating the Intercolonial there was a loss of $684,946 and on the Prince Edward Island Railway a deficit of $83,732. Since the system of subsidy of railroad enterprise was commenced by the Government the following are the sums paid over: For 1884, $208,000; 1885; $403,245; 1886, $2,171,249; 1887, $1,406.533; 1888, $2,027,041; 1889, $846,721.83; 1890, $1,491,595.72; 1891, $1,079,105.87. Total, $8,633,492.34. The Canadian Pacific, the Atlantic & Northwest and a few other subsidies are not included in the above. The total number of companies to whom payments have been made on subsidy account up to Dec. 31, 1891, is 61. Referring to the Canadian Pacific the Minister of Railways says: "The arbitrators appointed to adjudicate upon the claims made upon the government by the Canadian Pacific in connection with the construction of the section of railway built by the government between Savona's Ferry and Port Moody, B. C., amounting to about $12,000,000, have made their award, which amounts to $579,255. The arbitrators, however, have still two small matters of dispute to settle between the government and the company —one relating to steel rails in temporary tracks, etc., along the Pembina branch, amounting to $57,481, to which the company claim to be entitled free of charge, and the other being a claim arising out of the transfer, under agreement, of a surplus of 3,185 tons of steel rails remaining on the line between Port Arthur and Corss Lake at the date of transfer of this section by the Government to the company, the latter alleging that the value placed on these rails by the Government was excessive. The amount of the award is to be expended under the supervision of a government officer, whose duty it will be to see that the work covered by the award be well and faithfully carried out. Had this work been originally executed by the contractor he would have been paid for it at his contract schedule prices. The Government is involved in no actual loss, inasmuch as the arbitrators have merely decided that the Government had left undone work amounting to the value of $579,255, which was necessary to complete the road up to the standard called for by their contract with the company.

The Metropolitan Elevated Road, Chicago.

The Chicago & South Side Rapid Transit Co., the builders of the "Alley" road, has been granted by the Chicago City Council an ordinance giving permission to construct a similar line on the west side of the city and to extend the present line southward to Jackson Park. The ordinance was passed by a vote of 55 to 5. No objection was made by any member of the council. This company has made a good reputation by the excellence of work and design on the road already built, and in the speeches of some of the aldermen before the Council the company was highly commended. The "Alley" road will be in operation by the middle of May. A number of cars are completed at Jackson & Sharpe's, and ten of the locomotives are finished at Baldwin's. The West Side road will be called the "Metropolitan."

Senator Chandler's Joke.

"Boston & Maine employés are hereafter to wear uniform caps of blue felt, with metal designation of rank. The change is not agreeable, and there is a little friction in consequence."

The above announcement from the Portsmouth *Chronicle* is misleading. The friction is not with the employés engaged directly upon the road. It arises from the political and legislative employés who are endeavoring to persuade President Jones and Manager Sanborn that it is unwise to apply the uniform order to them. They say that their influence and usefulness will be destroyed if they wear uniforms or badges. "How can you expect me to control the caucus in our town if my big head is encased in a cap with a metal badge, 'B. & M. Agent' on it?" Another agent protested that it would not be of the slightest use for him to approach a member of the legislature with any such a cap on. A Merrimack County employé said he should feel proud to have his townsmen see the cap on his head. He would wear a collar with B. & M. on it if thought best. . . . —*Concord Monitor.*

LOCOMOTIVE BUILDING.

The order for locomotives, noticed last week, placed with the Brooks Locomotive Works by the Great Northern, is for 50 consolidation engines, which is now the standard for freight service for the road. These engines will weigh 128,000 lbs.; will have 19 × 26-in. cylinders; firebox, 114 × 36 in., and 210 2¼-in. flues. The pressure carried will be 180 lbs., and the tires and truck wheels will be furnished by Krupp. The capacity of the tanks will be 4,000 gallons.

BRIDGE BUILDING.

Burlington, Ia.—The bill amending the act authorizing the construction of a railroad, wagon and foot passenger bridge at Burlington, Ia., has been passed by both Houses of Congress.

Clinton, Tenn.—Anderson County, Tenn., will construct two iron bridges at Clinton.

Crookston, Minn.—The contract for erecting the iron superstructure of the bridge across the Red Lake River has been let to the Edge Moor Bridge Works, of Wilmington, Del. This work is to be finished on Nov. 1. The bridge is a single span, 195 ft. in length.

Cumberland, Md.—The Youngstown Bridge Co. has commenced the work of erecting the new steel bridge at Baltimore street, Cumberland, Md., after a delay of several months, owing to bad weather and other difficulties.

De Witt, Mo.—The bill to authorize the construction of a bridge across the Missouri River at De Witt, Carroll County, Mo., has been passed by the House.

Galt, Ont.—The Grand Trunk Railway has decided to replace the present wooden bridge over Mill Creek, near Galt, Ont., with an iron structure during the coming summer.

Grey County, Ont.—The Thoonbury town council has taken steps to compel the County Council of the county of Grey to assist in the construction of a bridge over the Beaver River in that village.

Havana, Ill.—The bill to establish a railroad bridge across the Illinois River, between the city of Havana, in Mason County, and a point on the opposite shore, in Fulton County, Ill., has been passed by the Senate.

Lexington, Va.—The Lexington Development Co., of Lexington, Va., will soon advertise for bids for the construction of a wire suspension bridge.

Milwaukee, Wis.—The City Engineer has been ordered to prepare plans and estimates for a bridge across the Milwaukee River to connect the first and sixth wards of the city.

Ottawa, Ont.—The proposals for the construction of a bridge between Ottawa and Hull are approaching a practical stage. The plans have just been submitted to the Dominion Government for approval. The drawings show that the structure will be 1,450 ft. in length to the last pier on the Hull side, and a 600-ft. approach will have to be constructed on that side. The bridge will be 400 ft. high above high water mark. The design shows five spans, the first from the Ottawa shore being 540 ft. long, the others being respectively 240, 240, 200 and 200 ft. The driveway will be 9 ft. 6 in. wide, and the foot path on each side 5 ft. 8 in.

St. Charles, Mo.—The bill authorizing the construction of a wagon and motor bridge over the Missouri River at St. Charles, Mo., has been passed by the House.

St. Cloud, Minn.—The Great Northern has awarded the contract for the iron superstructure of the bridge across the Mississippi River to the Edge Moor Bridge Works, of Wilmington, Del. This bridge is in four spans of 170 ft. each, and is to be completed about Oct. 1. The granite piers and abutments are already in place.

Sioux City, Ia.—The contract for the superstructure of the viaduct over the right of way of the Illinois Central and the Chicago, St. Paul, Minneapolis & Omaha has been let to the Lassig Bridge Works, of Chicago. It will be a plate girder structure, 240 ft. in length.

Trout Creek, N. B.—Plans for the erection of the superstructure of the new bridge, to be built across Trout Creek, N. B., have been received, and a number of contractors are studying them with a view of tendering for the work.

Washington, D. C.—The following bids were opened for the construction of a bridge across the canal at K street: Berlin Bridge Co., $3,393; Groton Bridge & Mfg. Co., Groton, N. Y., $2,988; J. V. Buddington, New Haven, Conn., $2,766; Pittsburgh Bridge Co., $3,293, and the Youngston Bridge Co., $2,627. The contract was not awarded.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

In Illinois the Supreme Court rules that a city council has no power to condemn land for a street for the express purpose of giving a railroad company the use of the street in such a manner as to exclude all other travel therefrom.[1]

In North Carolina the Supreme Court holds that a person who is not a dealer in railroad tickets, and who sells a single ticket, is not guilty, under a statute, making it a misdemeanor for any person "to sell or deal in" tickets issued by a railroad company, unless he is a duly authorized agent of said company.[2]

In New York it is held by the Court of Appeals that the statute providing that all companies organized under the laws of the state shall erect and maintain farm crossings for the use of the proprietors of lands adjoining the railroad, the owner of land adjoining the road on but one side has a right to a crossing such as may be necessary for him to reach his property. And this duty is not to be limited to crossings solely for agricultural purposes, but is deemed to include crossings to remove the natural products of the land, such as stone and minerals.[3]

In Michigan the Supreme Court rules that whether a railroad is or is not released from its obligation to maintain and keep in repair a bridge over a ditch at a farm crossing, under a contract with the farm owner, by a sale and conveyance of the farm, if thereafter it continue the crossing, and allow it to remain in such a condition as to invite its use as a crossing, it is bound to use ordinary care to see that it is kept in a safe condition; and this rule will apply in such case though the contract might be construed as requiring the company only to construct, and not to maintain, the bridge.[4]

Injuries to Passengers, Employes and Strangers.

In Iowa the Supreme Court rules that if a person in the waiting room of a station, not for the purpose of waiting for a train, is noisy, drunken, and profane, or otherwise disorderly, it is the right and duty of the station agent, upon his refusal to leave the room, to remove him, using no more force than is reasonably necessary for that purpose.[5]

In West Virginia it is held to be legal negligence for a passenger to ride in a fast-going passenger coach, with his arm protruding from the window, but not for him to rest his arm on the window sill if it does not so protrude.[6]

In Alabama a passenger sued to recover for personal injuries occasioned by his stepping into a hole in a bridge, which was constructed on the company's right of way, and connected its depot platform with a hotel. The bridge had been constructed by the hotel proprietor and turned over to the company for the use of passengers in going to and from the hotel for meals. It was several inches lower than the depot platform and was not connected with the ticket office, except through another room. The company had never repaired or exercised any control over it, and it had not been used by the company for any purpose within three years prior to the accident. The Supreme Court decides that passengers could not be presumed to know in regard to the ownership or control of such a structure and that the company was liable.[7]

In Indiana the Supreme Court holds that a rule of the company requiring its brakemen to examine the appliances which they are to use is not sufficient to exonerate the company from an accident resulting from its failure to perform the duty imposed on it by law to furnish safe appliances, where neither tools nor opportunity are given the brakeman to make the examination.[8]

In Kansas the Supreme Court rules that by continuing for three months in the employ of a railroad company as section foreman after the company has refused to furnish him with additional help, the foreman assumes all the risks and hazards incident to his employment, and he cannot recover for injuries sustained by him, in consequence of a want of sufficient help, while handling heavy rails, though the company threatened to discharge him if he did not perform his duties without additional help.[9]

In the Federal Court, while the plaintiff's intestate and other railroad hands, engaged in reconstructing a piece of wrecked track, were in removing wreckage by means of a derrick car, the derrick unexpectedly swung to the north and upset the car and killed the intestate. The ground at the place of the accident was softened by prolonged rains, and there was evidence that immediately after the accident the north rail under the car was found to be several inches lower than the south rail, although there was no curve in the track, and that the consequent slant was sufficient to cause the derrick to swing as it did. Some witnesses testified that only three ties were laid under each rail, others that there were ten or twelve. The court holds that such a slant of the track, whether due to careless construction or the sinking of the north rail after it was laid, is such a defect as constitutes negligence on the part of the railroad.[10]

The Supreme Court of Minnesota rules that where a crew of men are working on a construction train hauling earth, and it is the custom for them, when the train is loaded, to ride to the place where the earth is to be unloaded, and it is also the custom before starting the train for the engineer to ring the bell as a signal, the jury

[1] Ligare v. City of Chicago, 28 N. E. Rep., 934.
[2] State v. Ray, 14 S. E. Rep., 83.
[3] B. S. & C. Co. v. D., L. & W. R. Co., 29 N. E. Rep., 121.
[4] Stewart v. C. W. & M. Ry. Co., 50 N. W. Rep., 852.
[5] Johnson v. Chicago, etc., R. Co., 50 N. W. Rep. 543.
[6] Carrico v. W. V. C. & P. Ry. Co., 14 S. E. Rep., 12.
[7] E. T., V. & G. R. Co. v. Watson, 10 South. Rep., 228.
[8] C., St. L. & P. R. Co. v. Fry, 28 N. E. Rep., 989.
[9] A., T. & S. F. R. Co. v. Schroeder, 27 Pac. Rep., 985.
[10] A. T. & S. F. R. Co. v. Wilson, 48 Fed. Rep., 57.

may find it negligence for him to start without ringing the bell.[11]

In Michigan a railroad which had erected a bridge over a farm crossing permitted it to get out of repair, and an employé of the farmer sustained personal injuries by breaking through the bridge with a loaded wagon. The Supreme Court rules that the employé, in crossing the bridge, which was wholly on the roadbed of the company, acted on its invitation and not as a mere licensee.[12]

[11] Moran v. Eastern Ry. Co. of Minnesota, 50 N. W. Rep., 939.
[12] Stewart v. C. W. &. M. R. Co., 50 N. W. Rep., 852.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Cincinnati, Sandusky & Cleveland, semi-annual, 3 per cent. on the preferred stock, payable May 2.
Concord & Montreal, semi-annual, 3 per cent. on the preferred stock, Class I. (B., C. & M.), and 3 per cent. on Class IV. (Concord stock), payable May 2.
Long Island, quarterly, 1½ per cent., payable May 2.
New York, Susquehanna & Western, 1½ per cent. on the preferred stock, payable May 9.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Atlantic Avenue Elevated, annual, New York, N. Y., April 19.
Brooklyn Elevated, annual, Brooklyn, N. Y., April 16.
Canadian Pacific, annual, Montreal, P. Q., May 11.
Central of New Jersey, Annual, Jersey City, N. J., May 6.
Chicago, Burlington & Quincy, annual, Chicago, Ill., May 18.
Cincinnati, Saginaw & Mackinaw, annual, Saginaw, Mich. (East Side), April 19.
Delaware & Hudson Canal Co., annual, New York, May 10.
Lake Shore & Michigan Southern, annual, Cleveland, O., May 4.
Little Rock & Fort Smith, annual, Little Rock, Ark., April 28.
Michigan Central, annual, Detroit, Mich., May 5.
New York Central & Hudson River, annual, New York, N. Y., April 20.
New York, Chicago & St. Louis, annual, New York, N. Y., May 4.
New York, Ontario & Western, New York, N. Y., April 20.
St. Louis, Alton & Terre Haute, annual, St. Louis, Mo., June 6.
St. Louis, Iron Mountain & Southern, special, St. Louis, Mo., May 27.
St. Louis Southwestern, annual, St. Louis, Mo., May 4.
St. Louis Southwestern of Texas, annual, Tyler, Tex., May 2.
Traverse City, annual, Travers City, Mich., May 5.
Union Pacific, annual, Boston, Mass., April 27.
West Shore, annual, Albany, N. Y., April 20.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *National Association of Car Service Managers* will hold its next annual meeting at Philadelphia, Pa., April 27.

The *Association of Railway Accounting Officers* will hold its fourth annual meeting at the Auditorium Hotel, Chicago, Ill., May 25.

The *Master Car Builders' Association* will hold its annual convention at Congress Hall, Saratoga Springs, N. Y., June 15.

The *American Railway Master Mechanics' Association* will hold its annual convention at Congress Hall, Saratoga Springs, June 20.

The *American Association of General Baggage Agents* will hold its next annual meeting at Mackinac Island, Mich., July 20.

The *New England Railroad Club* holds regular meetings, at the United States Hotel, Beach street, Boston, Mass., on the second Monday of each alternate month commencing January.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The *New York Railroad Club* holds regular meetings on the third Thursday in each month, at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, N. Y.

The *Southern Railway Club* holds regular meetings on the third Thursday of the months of January, February, March, May, September and November at such points as are selected at each meeting.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November. By special resolution the next meeting will be held in April.

The *Northwest Railroad Club* meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station, at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m. in the directors' room of the St. Paul Union Station.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at the American House, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesday in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1,122 Girard street, Philadelphia, on the first and third Saturday of each month. The annual meeting is held on the third Saturday in January. The club stands adjourned during the months of July, August and September.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the South* holds its monthly meetings on the second Thursday at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Denver Society of Civil Engineers and Architects* holds regular meetings at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Association of Kansas* holds regular meetings at Wichita on the second Wednesday of each month at 7:30 p. m.

The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

The *Engineers' Club of Minneapolis* meets the first Thursday of each month in the Public Library Building, Minneapolis, Minn.

The *Canadian Society of Civil Engineers* holds regular meetings at its rooms, 112 Mansfield street, Montreal, P. Que., every alternate Thursday except during the months of June, July, August and September.

The *Association of Civil Engineers of Dallas* meets at 803 Commerce street, Dallas, Tex., on the first Friday of each month at 4 o'clock p. m.

The *Technical Society of the Pacific Coast* holds regular meetings at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., at 8 o'clock p. m. on the first Friday of each month.

The *Tacoma Society of Civil Engineers and Architects* holds regular meetings on the third Friday of each month, in its rooms, 201 and 202 Washington Building, Tacoma, Wash.

The *Engineers and Architects' Club of Louisville* holds regular meetings on the second Thursday of each month, at 8 o'clock p. m., at its rooms in the Norton Building, Louisville, Ky.

The *Association of Engineers of Virginia* holds regular meetings at Roanoke, on the second Saturday in each month, at 8 p. m., except the months of July and August.

American Society of Civil Engineers.

At the meeting in New York City on April 6, President Cohen presiding, it was announced that the annual convention would be held at the Hygeia Hotel, Old Point Comfort, Va., beginning June 8.

Mr. Willard Beahan read a paper on the Main Relief Sewer of Brooklyn, N. Y. There was discussion by Major Sears, A. Fteley, W. R. Hutton, C. S. Brush and the author. The report of the committee on Tests of Iron and Steel will be the subject for discussion at the meeting of April 20. The following members were elected on April 6: Honorary Member, James B. Francis, Past President. Members—E. H. Beckler, Chief Engineer Pacific Ext. St. P., M. & M., Helena, Mont.; Edward Mohun, Chief Engineer of Sewerage, Victoria, B. C.; Sam Tomlinson, Water-Works Department, Bombay, India. Associate Members—J. S. Elliott, West India Impt. Co., Jamaica, W. I.; W. C. Hawley, Chicago, Ill.; W. G. Kirkpatrick, of Landreth & Kirkpatrick, Engineers, Nashville, Tenn.; Edwin Mitchell, Cumberland Valley Railroad, Chambersburg, Pa.; W. F. Whittemore, Hoboken, N. J. As Associate—F. Hopkinson Smith. As Juniors—Charles Worthington Comstock, John Fletcher Fairchild, Henry Stilson Farquhar, Conrad Hewitt, Howard Crash ome Philips, Frederick Vernon Pitney and Charles William S. Wilson.

Civil Engineer's Society of St. Paul.

The regular monthly meeting was held on April 4, President Woodman in the chair, and 13 members in attendance. Mr. R. Davenport read a paper on "The Red River of the North."

Engineering Association of the South.

The next regular meeting of the Engineering Association of the South will be held at the association head quarters, in the Cumberland Publishing House, Nashville, Tenn., at 8 P. M. April 14. 1892. A paper will be presented by Mr. Jas. A. Fairleigh, of Chattanooga, Tenn., entitled "Municipal Engineering in Chattanooga."

Engineers' Club of St. Louis.

The club met April 6, at 8 p. m., at the club rooms, President Johnson in the chair, and 23 members and two visitors present. Messrs. A. A. Stuart, C. B. White and T. L. Condran were elected members of the club. Capt. C. F. Palfrey was proposed for membership.

Mr. E. A. Hermann then read the paper of the evening, on "Steam Shovels and Steam Shovel Work."

The steam shovel is not a very old machine; its general use dates from about 1875. The steam shovel for railroad use only differs from those for general work merely in being mounted on standard gauge trucks. The machinery of a steam shovel works either through positive gearing or through friction clutches. The latter works more rapidly and is better adapted to softer materials, but heats the cluches easily, often causing delays. The positive gearing machines are a little slower but more reliable, especially for hard material. Steam shovels vary in capacity of dipper from ¾ to 2 cubic yards. Discussions followed by Messrs. Crosby, Hermann, Ockerson, Wheeler.

Prof. Johnson exhibited the first scientific book on the truss bridge, entitled "Bridge Building," by S. Whipple, published in 1847.

For the next meeting, April 20, a paper by Mr. B. F. Crow on "Elements Involved in Rapid Transit" was announced.

National Convention of Railroad Commissioners.

The fourth annual meeting of the State Railroad Commissioners and the Interstate Commerce Commissioners began at Washington on Wednesday of this week. E. P. Jarvey, of South Carolina, was elected chairman. The report of the Committee on Uniformity in Railroad Accounting was read by William O. Seymour, of Connecticut, and W. B. Fleming, of Kentucky, read the report on Reasonable Rates. The committee recommends an amendment to the Interstate Commerce Law to provide that the Commission's findings shall, in equity proceedings, have the force of a Master's report in chancery. It is also recommended that the Commission shall have specific authority to employ counsel.

Mr. Wheeler, from the Committee on Discrimination Arising from the Use of Private Cars, read a report containing the following recommendations:

1. An amendment to the Interstate Commerce Law prohibiting the allowance of mileage for the use of private cars beyond a reasonable compensation for the car when loaded, and also providing that no mileage shall be paid for the return of the empty car.

2. A declaration that the allowance of free transportation to parties interested in or connected with private cars is contrary to the provisions of the Interstate Commerce Law, and that such parties do not properly come within the exceptions as recited in Section 22 of the aforesaid act.

3. A declaration that railroad companies, in the event that they haul in their trains the private freight cars of individuals, firms, or private corporations, must at the same time provide for the use of shippers engaged in like traffic with those using the said private cars a sufficient number of similar or equally convenient and available cars to meet all reasonable requirements of the public.

4. That in case any parties complain as to the mileage allowed or proposed to be allowed for the use of private freight cars, the questions as to what is a reasonable allowance be determined by the Interstate Commerce Commission, and that a statutory provision to that effect be enacted.

The Southern and Southwestern Railway Club.

The next meeting of the Southern and Southwestern Railroad Club will take place at the Kimball House, Atlanta, Ga., on Thursday, April 21, at 10 A. M. The subjects for discussion will be: (1st) "Rule No. 8, M. C. B. Code of Rules." (2d) "Joint Inspection." (3d) "Charges for Wrong Material in Freight Car Repairs." 4th, "Locomotive Cylinders, the effect of wear from packing, best style of packing ring where economy of first cost is considered." The experience of those using 18-inch cylinder or over is especially desired. The following committees are expected to make reports: W. H. Thomas and Pulaski Leeds—on Repair Work on large systems and location of plants for same. T. W. Gentry, W. H. Thomas and James Meehan—on the Best Sizes and Shapes and Modes of Fastening Draft Timbers, and best Type of Draft Rigging. C. F. Thomas, Wm. Hassmann and A. T. Hooker—on the Best Practice of Setting Flues and Proper Treatment of same to prevent leaking. Pulaski Leeds, A. W. Gibbs and Wm. Garstang—on the Most Suitable form of Performance Sheet for general use.

PERSONAL.

—Mr. A. H. Palmerton, formerly Superintendent of the Peoria & Eastern, has accepted a position as General Manager of the Rio Janeiro & Western Railroad, of Brazil.

—Mr. Wilford F. Smith, of Plankinton, has been appointed a member of the State Railroad Commission of South Dakota, to fill the vacancy caused by the resignation of Mr. Frank B. Phillips, of Watertown.

—Gen. George Stark, formerly Manager of the Boston & Lowell, and at one time Vice-President and General Manager of the Northern Pacific Railroad, died April 13, in Nashua, N. H. He entered the service of the Boston & Lowell road in 1836. Gen. Stark was 69 years old at the time of his death.

—Sir Edward W. Watkin, president of the Southeastern Railroad of England and a prominent director in other English railroads, and whose name is familiar to most railroad officers, was married in London last week to a wealthy widow, whose age is given at 33 years. Sir Edward Watkin is about 73 years old.

—Captain Nicholas T. Smith, who has been Assistant Treasurer of the Southern Pacific Co. since its organization was elected Treasurer at the annual meeting last week, to succeed Mr. Timothy Hopkins, resigned. Captain Smith has been assistant treasurer of the Southern Pacific Railroad for about 16 years, and was previously cashier and paymaster of the company.

—Mr. William Edgar, General Passenger Agent of the Grand Trunk, died in Montreal, April 13, aged 52 years. Mr. Edgar was General Eastern Passenger Agent of the Great Western, of Canada, for eight years. He afterward became the General Passenger Agent of that line, and continued in the same capacity with the Grand Trunk when the Great Western was consolidated with it.

—Mr. William C. Taylor, formerly Division Superintendent of the New York, Lake Erie & Western, died in Brooklyn, N. Y., this week. During the war he served as second in command under Gen. McCallum in the railroad service, and was Superintendent of Transportation with Gen. Sherman on the march to the sea. After the war, Mr. Taylor was connected with transportation schemes in the West.

—Mr. Cornelius Shields, General Superintendent of the Chicago, St. Paul & Kansas City, has resigned that position to become General Superintendent of the Western division of the Great Northern. Mr. Shields began railroading as a water boy on the Southern Minnesota division of the Chicago, Milwaukee & St. Paul, and occupied successively the positions of operator agent and dispatcher on that road. He afterwad went to the Canadian Pacific in 1882, and in 1886 accepted service with the St. Paul, Minneapolis & Manitoba, having charge of the construction of the extension from Minot, N. Dak., to Great Falls, Mont. In 1888 Mr. Shields accepted the position with the Chicago, St. Paul & Kansas City, which he now resigns.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—E. F. Burnett has been appointed Eastern Passenger Agent of the road, with offices at No. 261 Broadway, New York City.

Atlanta & Florida.—William S. Matthews is now Treasurer for the Receiver of this company. J. M. Whaling has been appointed Traffic Manager and Auditor of this company, with headquarters in Macon, Ga.

Brownstone & Middletown.—The following are officers of this company: Allen Walton, President; R. J. Walton, Superintendent; A. K. Walton, General Manager; E. A. Penney, Secretary. General offices, Waltonville, Pa.

Central of Georgia.—W. F. Shellman, formerly Traffic Manager of the road before the lease to the Georgia Pacific, has been reappointed to that position. He is at present General Manager of the Columbus Southern.

The portion of the Port Royal & Western Carolina road between Greenville and Laurens, S. C., is now under the control of B. C. Epperson, Superintendent, with office at Augusta, Ga.

Central New England & Western.—H. L. Harford is now Car Accountant, with office at Hartford, Conn., vice A. W. Henry, resigned.

Central of New Jersey.—George F. Baker, President of the First National Bank, of New York, has been made Vice-President of the road, in the place of Walter G. Oakman, who resigned some time ago to become President of the Richmond Terminal system.

Chicago & Alton.—H. C. Draper has been appointed Chief Engineer of the company, vice K. F. Booth, deceased.

Cornwall & Lebanon.—A. D. Smith has been appointed General Freight and Passenger Agent, vice R. B. Gordon, resigned, and with headquarters at Cornwall, Pa.

Denver, Apex & Western.—Nathan A. Baker has been elected Vice-President and General Manager, to succeed George W. Miller, who recently resigned. The other officers are: H. A. W. Tabor, of Denver, President; W. G. Smith, Secretary and Treasurer, and H. A. Sumner, of Denver, Chief Engineer.

Denver & El Paso Independent.—The following officers were elected at a meeting in Denver last week: Ex-Governor John Evans, of Denver, President; Jefferson Raynolds, of Las Vegas, N. Mex., Vice-President, and Judge E. T. Wells, of Denver, General Counsel. An Executive Committee was elected, composed of Jefferson Raynolds, of Las Vegas; James N. Carlile, of Pueblo; Delos A. Chappel, of Trinidad; O. L. Houghton, of Las Vegas, and Joseph Magoffin, of El Paso.

Duluth & Iron Range.—Thomas Owens has been appointed Superintendent of this road with office at Two Harbors, Minn.; A. M. Smith has been appointed Assistant Superintendent of this road with office at Two Harbors, Minn.

Georgia Southern & Florida.—The following appointments have been announced: A. F. Sherwood, Auditor, and J. R. Austin, Cashier. The positions of Auditor of Earnings and Auditor of Expenses have been abolished.

Gouverneur & Oswegatchie.—The incorporators are: Chauncey M. Depew, H. Walter Webb, Edward V. W. Rossiter, Frank Loomis, John M. Toucey, Theodore Voorhees, Charles F. Cox and Horace C. Duval, of New York City.

Great Northern.—C. Shields has been appointed General Superintendent of the Western division of the road, with jurisdiction from Minot, N. Dak., west.

Gulf, Western Texas & Pacific.—At the annual meeting of the stockholders, held in Victoria, Tex., April 4, the following board of directors was elected: C. P. Huntington, J. Kruttschnitt, C. C. Gibbs, W. G. Van Vleck, D. C. Proctor, A. Da Costa and M. D. Monserrate. Officers elected are: President, J. Kruttschnitt; Vice-President, M. S. Monserrate; Treasurer, W. J. Craig; Secretary, C. S. Wells.

Illinois Central.—Owing to the ill-health of J. W. Seymour, Division Superintendent of the Freeport Division, F. B. Harriman, Trainmaster, will act as Division Superintendent, with office at Freeport, Ill.

Junction (Philadelphia).—At the annual meeting of the company the following Directors were elected: George B. Roberts, John P. Green, N. P. Shortridge, A. A. McLeod and J. N. Du Barry. Mr. Roberts was elected President, J. C. Sims, Secretary; D. S. Newhall, Assistant Secretary; R. W. Smith, Treasurer, and W. J. Latta, Superintendent.

Lake Hopatcong, Boonton, Morristown, Caldwell & New York.—At a meeting of the promoters of the railroad held at Hopatcong Landing, N. J., April 9, Charles F. Noble, of Morristown, N. J., was elected President, J. Ward Smith of Newark, N. J., Secretary, and Theodore King, C. E., of Ledgewood, N. J., Treasurer, and William E. King, C. E., of Hopatcong Landing, N. J., was appointed General Superintendent.

Little Rock Belt.—The officers of this company are as follows: H. P. Bradford, President and General Manager; George R. Brown, Secretary and Treasurer; H. G. Fleming, Chief Engineer.

Long Island.—The annual meeting of the stockholders was held April 13. The following directors were elected: Austin Corbin, Charles M. Pratt, Frank L. Babbott, W. B. Dickerman, George S. Edgell, James D. Campbell, Dumont Clark, J. G. K. Duer, W. B. Kendall, Benjamin Norton, Daniel Lord, John P. Townsend and Everett R. Reynolds. Dumont Clark takes the place of W. G. Wheeler.

Louisville, Evansville & St. Louis.—James D. White, formerly Superintendent of Telegraph, has been appointed Assistant Superintendent.

Manitoba & Southeastern.—The following are Directors of this company: Alexander Logan, R. Bullock, A. F. Eden, J. Scott and James O'Connor, all of Winnipeg, Man.

Middletown & Hummelstown.—At a special meeting of the Board of Directors of the company, held at the general offices of the Philadelphia & Reading, in Philadelphia, C. W. Raymond, of Hummelstown, Pa., was elected a director of the company.

Monongahela River.—O. J. Sands has been appointed Treasurer, vice P. M. Robinson, resigned. G. F. Carrell has been appointed Auditor, with office at Monongah, W. Va., vice J. F. Stanhagen, resigned.

Morgan's Louisiana & Texas.—The stockholders of the railroad held their annual meeting last week, and elected the following directors: C. P. Huntington, New York; A. C. Hutchinson, New Orleans; J. G. Schriever, New Orleans; Julius Kruttschnitt, Houston, Tex.

Nevada Central.—I. N. Phelps Stokes, of 47 Cedar street, New York, has been elected President of this company in place of D. B. Hatch. A. B. Elliman has been elected Treasurer, succeeding Anson Phelps Stokes. G. A. Laud, of Austin, Neb., has been appointed Auditor vice O. B. Vincent.

New York & Boston Inland.—The Directors of the company have chosen these officers: President, Franklin Mead, Boston; Vice-President, D. L. Briggs, Middletown, Conn.; Secretary and Treasurer, E. D. Hewins, Boston; Clerk, E. R. White, Middletown.

Norfolk, Albemarle & Atlantic.—The stockholders of the company met at Norfolk, April 6, and elected George S. Jones, of New York, President. The old Board of Directors was also re-elected, with two additional directors.

Panama.—J. C. Warren has been recently appointed Acting General Superintendent, and R. W. Birgen Master of Trains, with office at Colon, U. S. of Columbia.

Pecos Valley.—Donald Allen has been appointed General Manager, with headquarters at Eddy, N. Mex., vice S. F. Judy, resigned. C. C. Blodgett has been appointed Assistant General Manager, with office at Eddy, N. Mex. E. F. Burnett, for some time with the Santa Fe as Passenger Agent, has accepted the position of General Passenger Agent of the road.

S. S. Satchwell is Assistant General Freight and Passenger Agent, with office at Eddy, N. Mex., in charge of traffic and claim matters of this company.

Philadelphia & Reading.—Alexander Mitchell, who has been appointed Superintendent of Motive Power and Rolling Equipment for the Eastern and Northern Divisions (Lehigh Valley) of the Reading road, is to "have charge of all work shops and engine houses on these divisions, and shall give such instructions to master mechanics and foremen of shops as shall insure uniformity and economy in the construction and repair of the rolling stock and machinery."

Philadelphia & Reading Coal & Iron Co.—The appointment of Joseph H. Harris as Vice-President of the Coal & Iron Co., with offices in Philadelphia, is announced. Mr. Harris was formerly Vice-President of the Central Railroad of New Jersey, and is President of the Lehigh Valley Coal & Navigation Co.

Philadelphia & West Chester.—The incorporators are: President, George A. Aldrich, Philadelphia; directors, William P. Logan, E. Clarence Miller, Herbert E. Aldrich, Philadelphia; John P. Logan, West Chester, Pa.; Thomas Briggs, Newtown, Pa., and Joseph R. Gillam, Langhorne, Pa.

Pittsburgh, Cincinnati, Chicago & St. Louis.—The following directors were elected at the annual meeting at Pittsburgh April 12: Briggs S. Cunningham, of Cincinnati; George S. Willard, of Chicago and Henry H. Houston, of Philadelphia.

Port Reading.—S. M. Williams, the Controller of the Central of New Jersey, has been made Second Vice-President of the Port Reading Company, and will have charge of the accounts of its leased lines.

Queen & Crescent System.—G. P. Biles has been appointed Assistant General Freight Agent, with headquarters at Cincinnati, O., vice R. X. Ryan, heretofore General Freight Agent.

Rio Grande Southern.—W. D. Lee, Assistant Superintendent, has been appointed Superintendent, with headquarters at Ridgway, Col. He succeeds D. M. Ridgway, who resigned to give more attention to his duties as Division Superintendent of the Denver & Rio Grande.

Seattle & Montana.—The Board of Trustees of the railroad have elected J. L. Cramer, Secretary, to succeed T. J. Milner.

St. Paul & White Bear.—This is the name under which the North St. Paul Motor line is now being operated. The officers are: President, W. S. Morton; Secretary, H. A. Castle, and Treasurer, B. F. Meek, Jr. The directors are: W. S. Morton, L. K. Stone, H. C. Levis, J. P. Lockey and H. M. Byllesby.

Silver Springs, Ocala & Gulf.—J. O. Clarke has been appointed General Freight and Passenger Agent of this company, with office at Ocala, Fla., vice G. N. Saussy.

Southern Pacific.—The annual election of officers of the company was held at San Francisco April 8. C. P. Huntington was elected President; C. F. Crocker, First Vice President; A. N. Towne, Second Vice-President; J. C. Stubbs, Third Vice-President; G. L. Lansing, Secretary and Comptroller; N. T. Smith, Treasurer; F. H. Davis, New York, Assistant Treasurer; C. F. Krebs, Kentucky, Assistant Clerk; I. E. Gates, New York, Acting Vice-President and Assistant Secretary. Executive Committee: Leland Stanford, C. P. Huntington, Charles F. Crocker and Thomas Hubbard.

Tacoma, Lake Park & Columbia.—The incorporators are: L. Curtis, Tacoma; William Bailey, New York; J. D. Miller, William Burroughs, C. S. Bridges, of Tacoma. W. Bailey has been elected President; W. Burroughs, Vice-President, and J. D. Miller, Secretary.

Union Pacific.—Frank B. Semple, recently of the Union Pacific passenger department in Denver, has been appointed General Freight Agent in Texas, with office at Fort Worth.

Western of Florida.—Joseph H. Durkee, Receiver of this company, has appointed L. E. Barker General Superintendent, with headquarters at Green Cove Springs, Fla. J. S. Driggs has been appointed Treasurer, with headquarters at Jacksonville, Fla.

RAILROAD CONSTRUCTION,
Incorporations, Surveys, Etc.

Adirondack & St. Lawrence.—The tracklaying on the southern end of the line has made considerable progres recently, and the track is now laid north of Remsen for about 17 miles, toward White Lake. As soon as the bridge at Trenton Falls is completed the ends of track between Remsen and West Canada Creek will be joined. The Elmira Bridge Co. is erecting the bridges on the middle portion of the route through the Adirondacks, but on the northern section the track has now been laid for about 15 miles south of Tupper Lake.

Alabama Grand Trunk.—The grading has been completed on first 11 miles from Montgomery to the Tallapoosa River and tracklaying will be commenced immediately. The contractor, J. A. Adams, of Montgomery, has four or five miles additional grading to complete to reach the Tallapoosa River. A 400-ft. bridge will be necessary to cross the river and it is probable that very little work will be done beyond it this season.

Atlantic Coast Line.—The report concerning the extension of the line to Newberne, N. C., above Wilmington, seems to have been premature. The engineer writes that it is proposed to survey a branch from Grifton, but the matter has not yet been decided and even the survey may be postponed until the fall.

Baltimore Belt.—The arch work in the Howard street tunnel of the Belt railroad, between the German street and Saratoga street shafts, in Baltimore, has been completed. The tunnel is now finished from Lombard street to a point north of Franklin street, a distance of more than 2,700 ft. Work is in progress on the east wall of the tunnel south of Lombard street, an opening having been made at the corner of Liberty and Lombard streets. The west wall from Lombard street to Dover street has been finished. There are now only five headings available for underground work in the main tunnel, north and south from Preston street shaft, north and south from Madison street shaft, and north from Franklin street. It is expected to complete the road within the year. Representatives of foreign holders of Baltimore & Ohio securities have been inspecting the road during the past few days.

Brantford, Waterloo & Lake Erie.—The promoters of the extension of this road from Waterford south to Simcoe Ont., believe that, including stations, station grounds and sidings, the extension can be built for $112,000. The route proposed is less than eight miles long.

Brownstone & Middletown.—This road is now completed, and is in operation between Brownstone, Pa., on the Philadelphia & Reading, to Waltonville, Pa., a distance of 2½ miles. The general office is at Waltonville.

Buckingham & Lievre.—This company has given notice of application to the Dominion Parliament for power to build a road from Buckingham, Que., on the Ottawa River, east of the city of Ottawa, on the River Lieveres, northerly to White Fish Lake, and thence along the River Lieveres to its source.

Buffalo & Hamburg.—The company has been chartered in New York to build a road from Buffalo to Hamburg, N. Y. Among the incorporators are: Lewis M. Wheelock, Hamburg, N. Y.; Milton E. Beebe, Fredonia, N. Y., and Benj. J. Hamilton, Buffalo, N. Y.

Burlington, Cedar Rapids & Northern.—The local papers in Iowa print an interview with President Ives in which he is reported as stating that the directors have decided to build a line from Estherville through the northern counties of Iowa to Forest City. It is also likely that the company will also build this year a line from Rockford northwest to Des Moines, Ia., a distance of about 15 miles.

Canadian.—The company which proposes to build the road from the Straits of Canso to Sydney, Cape Breton, has been organized under this name, and a bill has been introduced in the Canadian Parliament to charter the company for the construction of a line through Cape Breton via St. Peters. The capital stock is fixed at $2,000,000, with the usual bonding power to the extent of $20,000 per mile, and power is also asked to issue bonds for an additional $500,000 upon the tunnel, under the straits of Canso, for the purpose of giving unbroken railroad communication with the Eastern seaboard.

Canadian Pacific.—The company proposes to build a new bridge at Pembroke, Ont., and an embankment along the front of the town. It is also to construct a number of large stone culverts along the line between Pembroke and Mattawa, 94 miles, during the coming summer.

Charleston, Clendennin & Sutton.—The sub-contractors for the upper five miles of this line broke the first ground at Elk Two Mile, in Kanawha County, W. Va., for this line last Thursday. Work will be commenced all along the line within the next two weeks and every effort made to have the line ready for use by Dec. 1.

Chicago & Eastern Illinois.—Several contracts for double tracking on the main line south of Momence have recently been let, and it is reported that about 46 miles of double track is now under contract. The completion of this work will leave only a small portion of the line near Danville single track. The double track has been built as far as Momence, for several miles north of Danville, and at other points.

The proposed extension from Shelbyville to Herrick, by which the company will obtain a new entrance into St. Louis over the tracks of the Toledo, St. Louis & Kansas City, has been postponed for the present on account of the large amount of other improvements projected for this season.

Cleveland, Wooster & Muskingum Valley.—A local company has been organized to build a branch of this line from Wooster south to Millersburg, O., and has completed the location of the line for the 20 miles between those points. The right of way has been secured except between Millersburg and Wayne County, but this will be obtained shortly. The grading has already been commenced at Wooster by Ryan & McDonald, of Baltimore. The line is to be completed this season and will probably be operated by the Baltimore & Ohio.

Denver, Apex & Western.—The officers state that the contract for constructing the line west of Denver will be let in a few weeks. They expect to complete at least the first division of the road this season. A small amount of grading near Denver was done last year. The surveys have been completed to Georgetown, and it is proposed to begin the construction of the line at once. The first 12 miles west of Denver will be comparatively easy earthwork, but beyond that section there will be considerable loose rock and some hard rock cutting. The maximum grade is two per cent., and the maximum curvature 12 degrees. The main line is to extend west to Georgetown, Col., and a branch has been surveyed from Golden to Glencoe, Col., a distance altogether of about 63 miles.

Duluth, Messabe & Northern.—The City of Duluth has granted this company a 50-ft. right of way, adjoining that of the St. Paul & Duluth, from Fifteenth avenue west to the city limits.

First mortgage bonds to the amount of $1,300,000 have been authorized, and a mortgage in favor of the Metropolitan Trust Co., of New York, was filed at Duluth last week.

Duluth & Winnipeg.—This company will build a branch from La Prairie, Minn., seven miles, to the Buckeye Iron mine.

East Louisiana.—The extension which is being built from Abita Springs to Mandeville, La., on the north shore of Lake Pontchartrain, will probably be completed in about six weeks. The number of men at work on the grading has recently been increased and the track is being laid rapidly.

The ratification of the lease of the New Orleans, Spanish Fort & Lake Rail road, recently made by the

company, will be considerably delayed, because the lease will have to be forwarded to the English directors of the company, so that the actual transfer will not be effected much before August. The Spanish Fort road operates about seven miles of track and will give this company a more favorable entrance into New Orleans.

Elk Mountain.—T. H. Wigglesworth, Chief Engineer of this road, reports about 500 men already at work between Carbondale and Avalanche Creek, Col. It is proposed to lay 60 lb. rails on the entire road and the contract for these has been let to an Eastern company. The road will be 36 miles long, extending through Gunnison County from Carbondale to Robinson Lake, and it is expected to complete it before Aug. 1.

Everett & Monte Cristo.—The contractors are to begin the grading on this road at Marysville, Wash., this week, and as soon as the route near Everett has been finally settled the construction will be pushed very rapidly. The road is being built by the Everett Land Co., to reach the mines at Monte Cristo, in which Colgate Hoyt & Co., of New York, have large interests. The line will probably be extended from Everett southeast to Hartford, on the Seattle, Lake Shore & Eastern, about eight miles north of Snohomish and thence along the Stillagaumish River.

French Creek & Little Kanawha.—This road was chartered in West Virginia last week to build a line from Hampton, Upshur County, to Arnold's Springs, Lewis County. The principal office is to be at Buckhannon, W. Va. G. A. Newton and others are the incorporators.

Gouverneur & Oswegatchie.—The charter of this company was filed with the Secretary of State at Albany, N. Y., this week. The road is to extend from Gouverneur to Edwards, in Lawrence County, a distance of 15 miles. The capital stock is $350,000.

Grafton & Greenbrier.—The work of changing this road to standard gauge is still being pushed vigorously. An inspection made by the Baltimore & Ohio maintenance of way department last week develops the fact that it will require 30,000 new ties, eight miles of new rails and 60 days' work with the force now employed, and 100 additional men to prepare the road for the heavy traffic it will have when it is opened as a connection with the Baltimore & Ohio main line.

Great Northern.—The definite line of the Pacific extension has now been settled for 15 miles beyond Harrington and contracts have been let for the grading. This track is now almost complete between Spokane and Chattaroy, Wash. Some of the contractors have already finished their work and have moved on west. It has not yet been definitely settled when the work of construction will begin through Spokane. There are now about 60 miles of track to lay before the gap is closed between Calispel, Mont., and Albany Falls. That section will be laid within a month and then the road will be completed to Albany Falls. From that point to Spokane is about 50 miles and the track is to be completed from Albany Falls to Spokane by June.

Great Salt Lake & Hot Springs.—An extension is to be begun in a few weeks from a point on the present line near Farmington, Utah, to the new town of Woodman, and a second line is proposed to the coal mines near Devil's Gate, the extensions aggregating about 24 miles of road. The line is now being operated from Salt Lake City north through Hot Springs to Farmington, 15 miles. S. Bamburger is President and J. M. McCartney is General Manager, both with office in Salt Lake City.

Gulf & Chicago.—The control of this road has been recently secured by a New York and Eastern syndicate, the sale having been made by L. B. Cabell, of 53 Broadway. The new owners will change the road to standard gauge between Middleton, Tenn., and Pontotoc, Miss., 63 miles, and it is proposed to extend the road north to Jackson and also south from Pontotoc.

Harriman Coal and Iron.—It is proposed to resume construction work at once on the Brushy Mountain extension from Harriman, Tenn. The line has been practically graded the entire distance and the contracts for tracklaying will be given out shortly.

Hudson River Railroad & Terminal Company.—This company has been chartered in New Jersey to build a road from Little Ferry to Edgewater, Bergen County, N. J. The incorportaors are: T. C. Provost, Caldwell, N. J., M. J. DeWitt, Newark, N. J., and others.

Illinois Central.—President Fish spoke at some length to newspaper reporters while in New Orleans recently on proposed improvements and also denied many of the late reports concerning the road. He stated that there was no intention at present to build any additional second track on the line between Cairo and Chicago. About 64 miles of double track is now being operated between those points. Surveys have recently been made between Memphis and Cairo with a view, to obtaining a lower grade and possibly a more direct route, but it is not certain that any new road will be built this year. Surveys have been made between Parsons and Grenada connecting the two branches between Jackson and Memphis. President Fish thought it unlikely that the company would build a new grain elevator at New Orleans, but hoped that the merchants would build the structure. No plans have been made for a union station in New Orleans or for connecting the railroads entering the city with the new station built by the company. It was probable, however, that other roads would soon run into the new building.

Kansas City, Nevada & Fort Smith.—The extension of the line south from Hume, Mo., probably 50 miles, is soon to be undertaken. Assurances have been received from the Missouri, Kansas & Texas, it is reported, that that road will use the line to give it a new entrance to Kansas City. The capital stock of the company will be increased, and a stockholders' meeting has been called to vote on the question.

Lake Erie & Detroit River.—The town of Romney, Ont., has recently voted this company a subsidy of $10,000. This will, it is reported, insure the early construction of the road from Leamington, Ont., and north through the township of Romney, Tilbury and Raleigh, in the southern part of Norfolk County. The line runs west to Romney 10 miles and north a similar distance.

Macon, Dublin & Savannah.—The railroad has been granted terminal facilities into Macon, Ga., recently applied for and will immediately construct a bridge across the Ocmulgee River to cost $50,000.

Manitoba.—The bills respecting aid to the Canadian Pacific and Northern Pacific railroads were introduced in the Provincial Legislature last week. The Canadian Pacific asks that on completion of its extensions from Deloraine to Napinka, Man., and from Glenboro to form a junction with the Souris branch at the town of Souris and from there westward, that the Railroad Commissioners may pay to the company $1,750 for each mile constructed. The Northern Pacific asks for a like grant upon completion of its branch from a point on the main line between Bladur and Wawanesa southwesterly for a distance of 30 miles, the lines in both cases to be completed during 1892.

Maryland Roads.—The legislature, recently adjourned, passed the following railroad bills: To incorporate the Baltimore, Canton & Point Breeze, and the Maryland & Washington, and amending the charters of the Easton, Trappe & Cambridge, the Central and the Columbia & Maryland. The Governor withheld approval from an act to transfer the sum of $58,000 from the Elkton & Massey Railroad to the Eastern and Northern of Cecil County.

Maryland & Washington.—The bill chartering the company to build a road from Laurel to Washington, D. C., has been signed by the governor and is now a law.

Mexican International.—The contractors have completed the heaviest part of the work on the Durango extension and passenger trains will soon be running south of Torreon southwest to Pedracina. This will shorten the stage travel to Durango 57 miles.

Missouri, Kansas & Eastern.—Smith, Gillett & Co., of St. Joseph, Mo., have removed their construction outfit to Boonville, Mo., and will at once commence the construction of the road from Franklin, opposite Boonville, toward St. Louis. This firm has the contract for eight miles of grading and the masonry on 25 miles in addition.

Nelson & Fort Sheppard.—The British Columbia Legislature is pressing the Dominion government to grant a charter to the Nelson & Fort Sheppard Railroad to connect with the Kootenay Lake mining district in Southern British Columbia and American railroad system south of the boundary. There is strong opposition to the charter on the part of the Canadian Pacific. If the application is approved the road will be built by the Spokane & Northern.

New Brunswick.—The legislative council has passed a bill to incorporate a company to construct a railroad from Edmundston to St. John, down the west side of the St. Francis River. The measure was opposed by the Canadian Pacific, as the road would parallel that company's New Brunswick division, but was carried by a vote of eight to six.

New Roads.—The Richmond Cedar Works, now operating a road 10 miles long from Greenville, Ala., will add several miles more in a short time. It is proposed to reduce the grades in order to do a general freight and passenger business, if the city of Greenville will vote the subsidy which will be asked. The country it penetrates is heavily timbered with red cedar. Capt. C. P. Rogers, of Letohatchie, Ala., is Chief Engineer, and will have charge of the construction of the extension.

Messrs. Blackshear & Olliler, of Brewton, Ala., will at an early date build a road about 12 miles long west from Brewton. The line will be used at first principally for the logging business of the firm. Capt. C. P. Rogers, of Letahotchie, Ala., will be the Chief Engineer.

A San Francisco newspaper prints a story about the organization in that city of a syndicate to build a road to Salt Lake City, for which surveys have been commenced. The following names are printed as those of Directors who have subscribed $100,000 to the project: Alvin Z. Hayward, W. S. Hobert, James G. Fair, James Phelan, A. L. Hollidis, W. W. Montague, Adam Grant, Joseph Donohue, J. D. Stetson, and others.

It has been found necessary to defer the survey for the proposed road from Eureka to Red Bluff, Cal. Engineers Vincent and Willard, recently sent out by the Citizens' Committee for the purpose of exploring the Mad River Route, were obliged to turn back on account deep snow and heavy storms. The citizens of Humboldt County desire to secure the construction of a road to give the county better railroad connections with the South. There is a division of sentiment concerning the route to be followed. A large number are in favor of a road down the valley to connect with the San Francisco & North Pacific at Ukiah, while others favor a line to Red Bluff, to connect with the Southern Pacific. A survey of the former route has already been made, and construction will involve no difficult engineering works, while the line to Red Bluff will be a costly one, and about 125 miles long. Another engineering party will be sent out about May 1.

A road has been projected from Victor, in Monroe County, New York, south to Blood's Station, on the New York, Lake Erie & Western, a distance of about 30 miles, and meetings are being held in the various townships to secure the right of way and the local interests.

T. L. Malsalis, of Dallas, Tex., is projecting a road for the suburban development of Dallas, to extend from Hayes Station, in West Dallas to Mountain Creek, about six miles west.

B. E. Cartwright proposes to build this year a short road to be used principally for logging purposes between Hazel and Brandy Camp in Elk County, Pennsylvania. The new line will give the New York, Lake Erie & Western a route into Brockwayville and the Toby coal region.

The citizens of Grand Marais have employed a party of engineers to make a survey from that town on Lake Superior, north to connect with the Port Arthur, Duluth & Western, north of the Minnesota state line. The intersection with that road will be made probably near Whitefish Lake, and the line will be about 25 miles in length.

The citizens of Quitman, Tex., have been working for some time to secure the construction of a road from that point to Mineola in Wood County. It is now suggested that the cost of building the line will be considerably reduced if the rails for the 10 miles of road between those towns were purchased from the East Line & Red River road, which is soon to be made standard gauge.

New York, Susquehanna & Western.—The company is reported to have purchased this week, near Edgewater, N. J., about 1,800 ft. of river front property at a cost of about $125,000, and propose to establish a terminal at that point. A tunnel will be built through the Palisades to reach the projected terminals.

Norfolk & Western.—A report from one of the officers of the company states that over 100 miles of the Elkhorn extension has been completed out of the 190 miles which are being built between Elkhorn and the Ohio River. The balance of 90 miles has been practically graded and a considerable part of it is finished up and the track is being laid very rapidly on this part of the work. The contractors are working on all the sections of the extension, either on tracklaying or ballasting, and it is expected to complete the entire line in the autumn.

It is stated that an engineer corps will be put to work upon the Fairview & Logan branch next week. This line is a coal branch leaving the main line of the Ohio River extension and is to be built through Logan County, W. Va.

A branch will be built from near Grove Hill, Va., to the Massanutton Mountain, a distance of about three miles.

Norfolk, Wilmington & Charleston.—The organization of the South Carolina Land Co., of Charleston, S. C., a construction company, is the latest step in the development of the scheme for building this road. The company has been formed by those identified with the railroad project. The officers are: A. A. Gaddis, President; C. H. McKibben, Vice-President; J. U. Bethell, General Manager. The land company has entered into a contract with the railroad company for the construction of the road from Charleston to the North Carolina line, including the building of bridges and stations, and of the Charleston terminals of the road. The land company's agents will go over the proposed route for the purpose of soliciting subscriptions from townships and counties, and to obtain rights of way.

Northern Pacific.—The local officers have recommended an extension of the Burnett branch to the anthracite coal fields in western Washington, about 35 miles southeast of Tacoma. The survey has been made up South Prairie Creek for six or eight miles east of Pittsburgh, the present terminus of the branch.

The chamber of commerce of Colfax, Wash., has secured subscriptions amounting to about $20,000 for the proposed road from that town east, to connect with the Northern Pacific near Palouse, Wash. Committees have been appointed to raise further subscriptions and secure right of way for the new line, which will be about 18 miles long, extending from Colfax to a point several miles east of Palouse.

Instructions have been received from New York to push to an immediate completion all the construction work on the line to Ocosta, Wash., on the Pacific Coast.

Orange Belt.—A. L. Hunt, Chief Engineer of the road, is reported to have commenced a survey for a branch from Macon to Inverness, Fla. The building of this road would, it is believed, result in the converting the Western division of the road to standard gauge between Lacoochee and St. Petersburgh.

Paducah, Tennessee & Alabama.—Maj. N. R. Olcott, Chief Engineer of the road, has begun a preliminary survey for a connection with the Tennessee Midland, recently acquired by this company. The surveys will probably be begun at Hollow Rock, Ky., the present terminus of the road, and run to Perryville, Tenn., on the Tennessee River. Other surveys will also be made, intersecting the Tennessee Midland at various points west of Perryville, which is the terminus of that road. The line to the junction with the Tennessee Midland will be about 55 miles long and the route chosen for the line will depend largely on the cost of securing the right of way and the amount of the subsidies voted by the towns.

Pasadena & Mount Wilson.—W. H. Knight, one of the officers of this project, reports that material is rapidly being taken from Pasadena, Cal., to the base of the mountain to be used in the construction of the railroad. Work will begin immediately.

Philadelphia Belt Line.—An attempt made last week by the Pennsylvania road to cross the tracks which the company is laying near Bridesburg enlivened the construction work for several days last week. The grading has been progressing steadily northward from Allegheny avenue to Bridesburg for several months. The road is now finished and the tracks laid from Allegheny avenue through the Twenty-fifth Ward, and the grading is nearly completed to Bridesburg, with the exception of about 100 ft. at Baistol street.

Philadelphia & Reading Terminal.—Much the larger part of the masonry work for the Philadelphia Terminal has been constructed and much of it is ready to have the track placed in position. The track is now being put down along Willow street east of Broad street. The Pencoyd Iron Works, which has the contract for supplying the iron bridge work, have received orders to push it as rapidly as possible. Along Willow street, from Broad to Twelfth the road is to be constructed entirely of iron truss work supported by piers of masonry. These piers are ready and work will be started on the iron structures at once, and pushed as rapidly as possible. All the bridges from Callowhill street northward to Twelfth and Willow and Ninth and Green are to be of iron.

Philadelphia & West Chester.—The proposed Philadelphia & Reading branch to West Chester, near Philadelphia, was incorporated last week under this name. The capital stock is $200,000. The road will be six miles long, extending from West Chester to Exton station, on the line of the Chester Valley Railroad. The latter road is part of the Philadelphia & Reading system, and the new branch line will be operated by it also. Whether the Philadelphia & West Chester will be leased or bought outright by the Reading has not been decided upon. The new line will parallel the West Chester branch of the Pennsylvania. The directors of the new company are identified with other small railroad concerns. Before applying for a charter they had the new route surveyed and secured right of way for the line.

Potomac Valley.—The bridge work near Williamsport and over the Potomac River near Cherry Run, which has delayed the construction of the road is now about completed, and the tracklaying has recently begun on the last section of the road. The principal work to be done is near Cherry Run, and as soon as the track is laid at that point the road will be completed between Williamsport, Md., and the Potomac River, a distance of 14 miles.

Quaker City Elevated.—The ordinances for the construction of this elevated road in Philadelphia, passed by City Councils early in January, provided for the active commencement of construction work in six months. So far no work has been begun on the road, but the promoters of the enterprise claim that they have not been inactive. Plans have been prepared and adopted, and releases from property owners for all claims for damages have been secured from quite a number of people along the proposed route, chiefly, however, along the Ridge avenue branch, which is to extend from Ninth street to Lehigh avenue. On the Ridge avenue branch, releases for a distance of two miles have been secured. On the Market street branch, while some releases have been effected, the work has not been pushed as vigorously as

upon Ridge avenue, where the work will be first begun. While no contracts have been awarded or even proposals invited, the officers of the company say that they will be ready to begin operations before the time limit required by the ordinance has expired. The plans for the road on Ridge avenue call for a double track road to be erected in the centre of the street and over the tracks of the Ridge Avenue Passenger road.

Ravenswood, Spencer & Glenville.—A change in the plans of this company has been made whereby, instead of ending at Glenville, with no further railroad connection, it will change its course from Spencer, W. Va., and make an almost straight line to Burnsville, Braxton County, W. Va., there to connect with the West Virginia & Pittsburgh road of the Camden system. This change not only gives it a Northern connection but opens a rich coal and lumber country. It is stated that the balance of the line will be built this summer.

Tacoma, Lake Park & Columbia River.—The company was incorporated in Washington last week to build a road from Tacoma south and southeasterly via Lake Park and near the confluence of the Sic and Little Mashel Rivers to a point on the Columbia River east of The Dalles. The road will be 147 miles long, and will run through the Cowlitz Pass to The Dalles. The Tacoma & Lake Park, 10 miles long, has been purchased by the company.

Texas Western.—P. W. Smith and J. C. Reif, of New York City, who are now the principal owners of this road, having purchased the controlling interest of Elijah Smith some time ago, have recently made an inspection of the route between Houston and Sealey, Texas, 53 miles. They expect shortly to begin the standard gauging of the road unless a sale is effected. A new company will be formed and the line extended beyond Sealey a number of miles. About a year ago, they state, the late H. K. Enos, President of the Missouri, Kansas & Texas, began negotiations for the sale of the road to that company, but the terms proposed were not satisfactory and the arrangement was never consummated.

Union Pacific.—A report is printed in the Denver papers that the company has decided upon the early inauguration of work on the unfinished Pioche extension. The road will be completed this year from Milford, Utah, to Pioche, Nev., 105 miles. Eight miles of the track was laid two years ago. It is claimed that the mine owners at Pioche have guaranteed the shipment of 150 tons of ore a day for a year after the line is completed. Nevertheless it is doubtful if very much construction work is done this year.

Wabash, Chester & Western.—N. W. Irish & Co., of Carlyle, Ill., who have the contract for the earthwork on the Mount Vernon extension of this road, have just begun that work. The contract for the timber work on the extension has been let to Taylor & Lutes. The line is being built under the charter of the Tamaron & Mount Vernon Railroad, and is about 22 miles long, beginning at the terminus of this road and extending northeast to Mount Vernon, Ill., where it intersects the Louisville, Evansville & St. Louis. It is nearly an air line, with no towns along the route, and the construction work will be about of the average character for southern Illinois. The maximum grades are 35 ft. to the mile and the maximum curves nine degrees through the towns. The principal bridge work will be the erection of a trestle 915 ft. long and 27 ft. high. Several other smaller trestles will be required, but no iron bridges. C. B. Cole, of Chester, Ill., is the Vice-President, and Robert Moore, of St. Louis, is Chief Engineer.

Williams Valley.—Col. John Jamison, who has the contract for the extension to Lykens, Pa., has increased his force, and now that the weather has become more favorable for construction, he expects soon to have a large number of men on the grading beyond Brookside. The grading has been continued during the greater part of the winter. The extension now being built is nine miles long and will connect the Tyrone branch of the Philadelphia & Reading with the Summit branch road.

GENERAL RAILROAD NEWS.

Great Northern.—The report of earnings for March shows an increase of $500,000 or 40 per cent., and for the nine months of the fiscal year the increase is 20 per cent. A large increase of mileage accounts for part of the large earnings. The statement for March is as follows:

	1892.	1891.	Inc. or dec.
St. P., M. & M. leased lines.	$1,285,990	$737,428	I. $548,561
Eastern Ry. of Minn.....	71,285	52,808	I. 18,476
Montana Central.....	87,355	92,293	D. 4,938
System.....	$1,444,630	$882,531	I. $562,099

Milwaukee, Menomonee Falls & Western.—The name of this road has been changed to the Milwaukee & Superior Railway. The road extends from Granville to Sussex, Wis., 12 miles.

Illinois Central.—The income from traffic for the eight months ending Feb. 29, 1892 and 1891, was as follows:

	1892.	1891.	Inc. or dec.
Miles operated.....	2,884	2,875	9
Gross receipts.....	$13,250,608	$12,244,754	I. $1,005,854
Oper. expen. & taxes	9,363,728	8,356,522	I. 1,012,206
Net earnings.....	$3,881,880	$3,8 8,232	D. $6,352

The gross receipts from traffic for March, 1892, are estimated at $1,505,774; for March, 1891, the receipts were $1,425,330, the estimated increase being $80,444.

Northern Pacific.—The gross earnings for March were $2,308,519, as compared with gross earnings of $2,184,522 in March, 1891, the increase being $123,997. The operated mileage was 5,199 miles, 140 greater than in March last year.

Pittsburgh, Cincinnati, Chicago & St. Louis.—The annual report read at the stockholders' meeting, at Pittsburgh, April 12, shows gross earnings of $14,895,591 and net earnings of $3,955,723, a decrease of $31,661 as compared with 1890. The net profits, however, show an increase of $202,057. Dividends have been paid at the rate of four per cent. on the preferred stock.

St. Lawrence & Adirondack.—This road which has been operated by the Canada Atlantic since January has passed under the temporary control of the Central Vermont last week. The road runs from Valleyfield to Malone, N. Y., 40 miles, and is part of the Adirondack & St. Lawrence system.

Savannah, Americus & Montgomery.—The disputes over the through freight traffic to Savannah between this company and the Central of Georgia, arising out of the joint use of the line between Lyons and Savannah have been settled this week. The line between those points will now be operated as before the Richmond & Danville lease, under the terms agreed upon during the construction of the road. When the Richmond & Danville began the operation of the Central of Georgia, an attempt was made to hinder the through competitive traffic of the company over the 75 miles between Lyons and Savannah, so that the company had to seek a roundabout route for this traffic. This action will probably result in the dismissal of the engineers who recently began the surveys for a parallel route into Savannah.

Western Maryland.—The various proposals for the sale of the interest of the City of Baltimore in this property have been laid over until September, the City Council having adjourned to that date without taking action on any of the propositions. The only proposal for the purchase of the city's interest, which is likely to come up for consideration by the city, is the offer of the Baltimore & Cumberland, a projected extension of the West Virginia, Central & Pittsburgh. The terms of this offer have been given in these columns. It has been forwarded to the City Council by the Finance Commissioners with a favorable recommendation. President Hood states that the company will be able to pay this year part of the interest on the bonds guaranteed by the city, which has not been earned for a number of years.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, April 13, 1892.

Messrs. James M. Hall, A. J. Smith and George de Haven, acting as arbitrators, have reported on an appeal taken by the Chicago, St. Paul & Kansas City from a decision by Chairman Finley adjudging that road guilty of a violation of the rules of the Western Passenger Association, in that a conductor failed to exercise due diligence in accepting a mileage ticket purchased of a broker and presented by a party who signed a name not corresponding with the signature on the ticket. The Chicago, St. Paul & Kansas City claimed, first, want of jurisdiction on the part of the chairman, and, second, a reasonable compliance with the rules of the Association. The arbitrators sustained the chairman on the first point but reversed his decision on the second on the ground that the evidence submitted fails to establish a willful violation of the rules.

Commencing April 16 the Chicago-St. Louis lines will demand full local rates on tickets from Pittsburgh to St. Louis via Chicago. This action is taken to prevent the scalping which has been largely done on these tickets when sold on a mileage basis as heretofore.

The suits which Armour & Co. have begun to recover over $1,000,000 in alleged overcharges on dressed beef which were charged by various lines during the first year after the passage of the Interstate Commerce Act, are based on the claim that these charges were excessive and illegal. Prior to that time the rate had been 46 cents; subsequently the Commissioners fixed it at 65 cents, and it was kept there for 14 months, during which time the rate was paid under protest, and they now seek to recover from each line to whom payments were made at the 65-cent rate during that time.

Chairman Finley has granted authority to the lines in Western Passenger Association territory to use the reduced Ohio River rates as a basis for making through rates via Chicago to Cincinnati, Indianapolis, etc. This action will satisfy some of the St. Paul lines who have been complaining because the published through rates to this territory were more than the sums of the locals via Chicago since the reductions east of this city.

The Chicago & Northwestern having been cut off by the Central Traffic lines (except the Chicago & Grand Trunk) from filling shipments destined to points in that territory from this city, and charging the Eastern lines a proportion of the through rate, has given notice that, commencing April 1, it will demand a switching charge of $3 per car, an advance of $2. A special meeting of the Chicago Committee of the Central Traffic Association was held Monday and the following resolution adopted:

"*Resolved*, That the Chairman be requested to appoint a sub-committee to confer with the Chicago & Northwestern Railway and call its attention to the fact that it has violated an agreement of some years' standing, and ascertain if it is the intention of said road to continue violating that agreement, and, if so, this committee to be advised of the Northwestern's reply and then take action."

It is not probable that the Northwestern will hasten to rescind its action at the request of the Central Traffic Association, but might quite pertinently "call the attention" of the sub-committee to the old saw "What's sauce for the goose is sauce for the gander."

Traffic Notes.

A further cut of 50 cents in the passenger rate between Cincinnati & Chicago is announced, making the fare between the two cities $5.50.

The Union Pacific has just taken from Kansas City a train of 32 platform cars loaded with threshing machines and engines destined for Portland, Or. The goods came from Massillon, O.

The principal railroads of Kansas and Missouri are taking steps to establish car service (demurrage) organizations at junction points and larger stations on their lines. The Chicago, Burlington & Quincy has not taken part in the negotiations, but will, it is said, co-operate in the movement. About 150 stations will be covered.

The Southern Pacific Company refuses to honor tickets issued by the Atchison, Topeka & Santa Fe at San Diego and Los Angeles reading by way of Sacramento and Ogden to Eastern points. The tickets have been issued for the purpose of diverting a portion of the business over the Colorado Midland, a Santa Fe line.

At a meeting of the general freight agents of the roads interested in the anthracite coal fields, this week, an advance in rates was decided upon. The rate to Buffalo is to be increased from $2 to $2.25, and those to Lake Ontario ports are fixed at $2.10, which is an advance of 30 cents. The rate to Chicago will probably be increased.

Philadelphia shippers are congratulating themselves on the adoption by the Pennsylvania Railroad of a manifold shipping receipt and invoice. The paper is in triplicate and is used in conjunction with carbon paper, one writing filling out the three simultaneously, thus doing away with the labor of writing out the three separately.

The railroads and steamships doing business between Los Angeles, San Pedro and Redondo, Cal., have made an agreement to pool all the business between these cities. The companies interested are the Southern Pacific, Atchison, Topeka & Santa Fe, Los Angeles Terminal and the Redondo railroads, the Coast Steamship Co. and the Wilmington Transportation Co.

The promoters of a proposed railroad from Seymour, Tex., westward have petitioned the State Railroad Commissioners to exempt the proposed road from the rate restrictions the of Board for a term of years, claiming that with this immunity it will be possible to raise the money for building the road, while without it the money cannot be had. The Commissioners have signified their willingness to grant exemption for three years, but do not bind their successors in office.

The Interstate Commerce Commission.

The Commission, in an opinion by Commissioner McDill, has announced its decision in the cases of the Toledo Produce Exchange, etc., and Edward Kemble, of Boston, against the Lake Shore, the Michigan Central, the New York Central and the Boston & Albany roads, in favor of complainants. The question involved is the through rates to Boston as affected by the arbitrary differentials over through rates to New York of 10 cents on first-class, 6 cents on second-class and 5 cents on the other classes of freight. The Commission decides that the arbitrary differentials now charged are unlawful, and that they should be made by adding a percentage to the New York rate, and that the carriers interested be allowed twenty days to show cause why order should not issue commanding them to desist from charging said arbitrary differentials, and requiring said rates to Boston and New England points to be made by adding to the New York rate an increase of 10 per cent. thereof, and if no such answers be filed that such order be issued forthwith.

It will be seen that the rates which the Commission proposes to order are a trifle higher than those which the Boston & Albany has already asked its connections to adopt. It is to be hoped that the Commission's order will not require the percentage rule to be followed so far as to require fractions of cents in the tariffs, as the rates are used at a large number of stations and a tariff of that sort would entail an untold amount of brain wear upon clerks and shippers throughout indefinite future ages.

Texas Traffic Matters.

Mr. E. H. Hinton, General Freight Agent of the Texas & Pacific, is one of the best talkers on Texas matters that we know of. Possibly he is prejudiced in favor of the railroads, but his interviews with reporters give clear statements about what is going on and are always readable. We quote extracts from the New Orleans *Picayune;*

"The Texas Railroad Commissioners are still reducing rates in a most radical manner. They are seriously crippling the railroads and doing the state incalculable injury in unsettling values and in destroying that confidence that is absolutely essential to the investing of capital and the development of the resources of the state. Among their last tariffs are rates on beef and stock cattle, etc., in which they make a general reduction on our line of about 50 per cent. These rates were made without judicial inquiry as to the reasonableness or unreasonableness of the former rates, and without giving the railroads any opportunity to present evidence.

"Mr. Hinton said that the lumber trade was dull, owing to the paralyzing effect of the Commission's rate adjustment upon the lumber mills on the line. The only new industry at present being organized is the establishment of a number of oil mills in consequence of the great reduction in the cost of oil machinery. The reduced rate on cotton seed made by the Texas Commission had no bearing upon the matter.

"The oats and wheat crops are excellent. There is a large acreage of oats. The amount of wheat next season will be far in advance of last season, and that was exceptional."

Emigrant Traffic.

Reports of trunk line disturbances over emigrant rates are not given out to reporters to any great extent, but some of the Western papers do some pretty ingenious guessing, and often hit the truth. Here is a sample which is probably not far out of the way: "The minutes of the Trunk Line passenger meeting, April 5, show that the staid old Pennsylvania cut immigrant rates in a way worthy of its most conscienceless competitor. Its representative at the meeting acknowledged that he had hired the notorious 'Nick' Muller to go to Ellis Island (New York) and cut agreed rates on 320 immigrants. He did not confess the rate on which the immigrants were taken from New York to Chicago, but it is thought to have been a cut of from $2 to $3 a head. All this was done in spite of the supposedly cast iron agreement that all immigrants should go through the clearing house. The Pennsylvania's excuse was that it took this action to meet Lackawanna competition, but it was immediately put in evidence that the Lackawanna had the day before agreed to come into the pool; that it had discharged 'Nick' Muller, and that the Pennsylvania, knowing this, hired Muller to do the same work which he had previously done for the Lackawanna. The Trunk Lines have not yet recovered sufficiently from their surprise to know what to do. The Pennsylvania has promised never more to fall from grace, but its competitors declare it must at least accept a reduced percentage of the pooled business."

Eastbound Freight Shipments.

The shipments of eastbound freight from Chicago by all the lines for the week ending April 9 amounted to 89,878 tons, against 93,913 tons during the preceding week, a decrease of 3,035 tons, and against 62,694 tons during the corresponding week of 1891, an increase of 27,184 tons. The proportions carried by each road were as follows:

Roads.	W'k to Apr. 9.		Week to Ap'l 2	
	Tons.	P. c.	Tons.	P. c.
Michigan Central.....	11,764	13.1	12,832	13.8
Wabash.....	8,352	9.3	11,062	11.9
Lake Shore & Michigan South.	7,348	8.2	8,802	9.5
Pitts., Ft. Wayne & Chicago...	7,117	7.9	5,815	6.3
Pitts., Cin., Chicago & St. Louis	5,281	5.8	4,307	4.6
Baltimore & Ohio.....	4,453	4.9	4,806	5.5
Chicago & Grand Trunk.....	14,574	16.2	14,572	15.7
New York, Chic. & St. Louis...	8,020	8.9	7,607	8.2
Chicago & Erie.....	14,000	15.8	16,012	17.2
C., C. C. & St. Louis.....	8,379	9.9	6,985	7.5
Total	89,878	100.0	92,913	100.0

The three Vanderbilt lines together carried 30.2 per cent, while the two Pennsylvania lines carried 13.7 per cent.

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The WESTINGHOUSE AUTOMATIC BRAKE is now in use on 24,000 engines and 292,000 cars. This includes (with plain brakes) 200,000 freight cars, which is about 20 PER CENT. of the Entire Freight Car Equipment of this country, and about 80 per cent. of these are engaged in interstate traffic, affording an opportunity of controlling the speed of trains by their use on railways over which they may pass. Orders have been received for 140,000 of the Improved Quick-Action Brakes since December, 1887.

The best results are obtained in freight train braking from having all the cars in a train fitted with power brakes, but several years' experience has proven conclusively that brakes can be successfully and profitably used on freight trains where but a portion of the cars are so equipped. Below is a graphical illustration of the progress made in the application of the Automatic Brake to freight cars since its inception

Year.	No. per year.	Grand total.
1881	105	105
1882	1,085	1,190
1883	4,966	6,156
1884	15,051	21,207
1885	10,410	31,617
1886	8,946	40,563
1887	9,281	49,844
1888	27,696	77,540
1889	26,065	103,605
1890	50,502	154,107
1891	39,061	193,168

193,168 freight cars fitted with the Westinghouse Automatic Brake, which is nearly 20 per cent. of the Entire Freight Car Equipment of this country.

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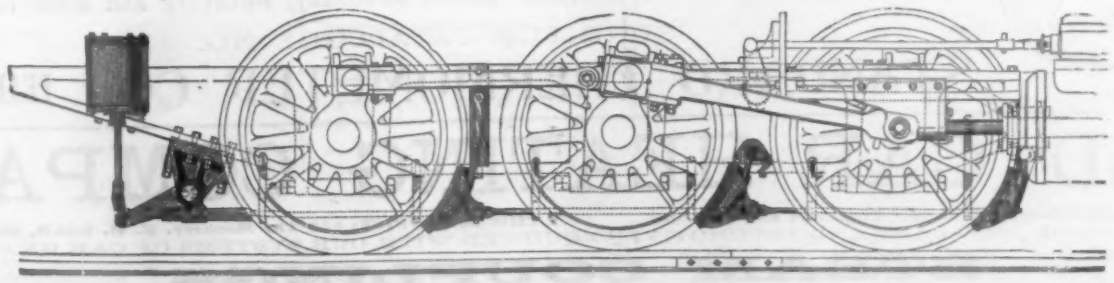
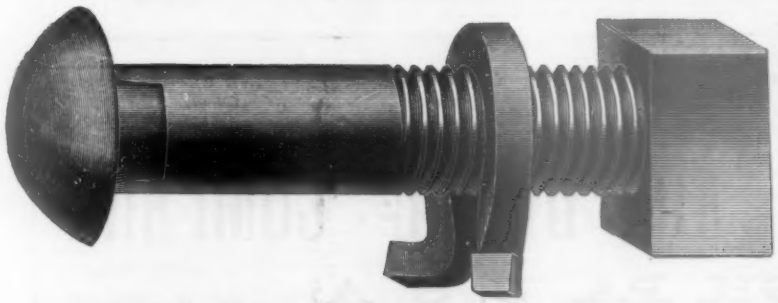


Standard Outside Equalized Pressure Brake, for two or more pairs of Drivers, furnished to operate with either STEAM, AIR or VACUUM.

THE "STANDARD" NUT LOCK



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SAMPLES FREE.

This nut lock is presented on its merits as the best and cheapest device for securing track joints.

It is a torsional loop made of good quality of tempered spring steel, having horizontally inclined foot pieces, which are curved inward, thereby greatly increasing the spring resistance and acting simultaneously; rests upon the base of angle bar, or underlying rail base in case of fish plate, preventing the loop portion from rotating and hammering down *thread* of *bolt*.

The nut lock for ¾ bolt made of ½ in. square steel, standard pattern, yields a tension of 4,300 lbs. on the bolt, which is sufficient to reduce the wear of the bearing surfaces of the angle bars on the rails, imparting, as it does, a uniform bearing the entire length of the bar.

The "Standard" Nut Lock has sufficient elasticity to maintain a tight joint, which cannot be truthfully said of many light-weight single coil washers.

The "Standard" Nut Lock is, in its superficial form, similar to an annular coil twisted out of plain, *i. e.*, the curved shoulders or ends of the loop proper are spread in the usual manner of spring coils, at which bearing points the locking friction is equal to that of the best single coil washer, and added to this it is terminated in *inwardly curved* extensions, which must apparently furnish additional short leverage spring force of a torsional character.

Distinctive Merits of the "Standard" Nut Lock, Condensed:

Fixedness of position—cannot rotate and hammer down threads of bolt.

Cannot get one end into elongated slot of angle-bar.

Unlike any permanently placed, double washer, the Standard *is* interchangeable regardless of distance between bolts.

Cannot be put on wrong side out, as the outward projection of the foot pieces would prevent the nut being turned up.

Has more spring power directly under the nut than any two ordinary coil nut locks.

Being fixed in position, it offers double the locking friction of nut locks, which when in their *dead* "set" condition turn back with nut by the vibrative effect of passing train.

The "Standard" Nut Lock embodies the old principle of spring power improved by overcoming the objection to the double washer or nut lock, and covering the weak points of the single coil washer.

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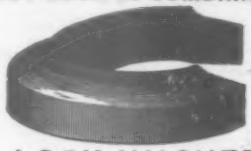

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A trial is requested.

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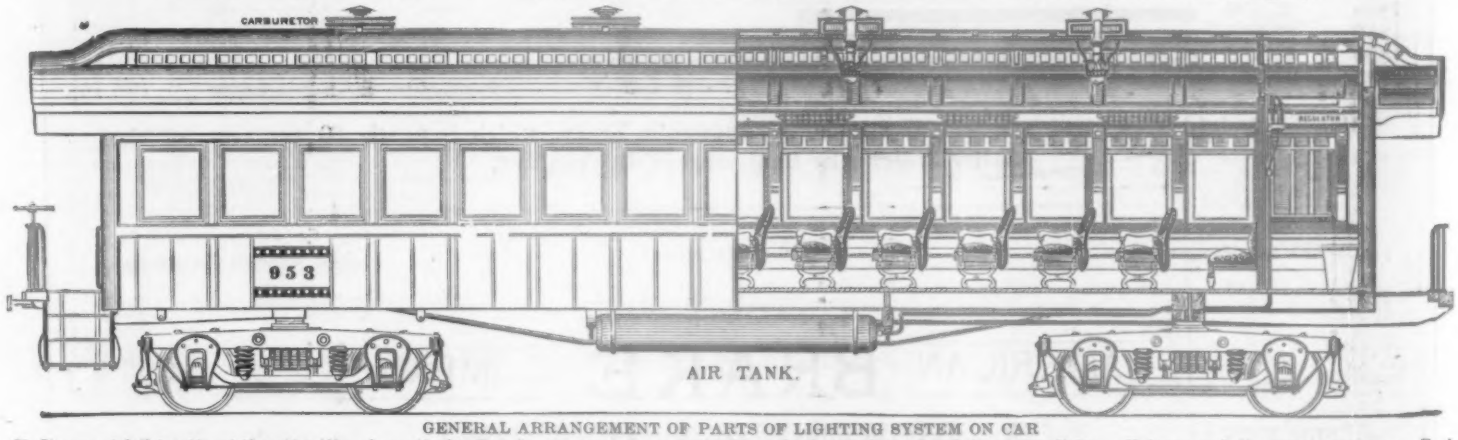

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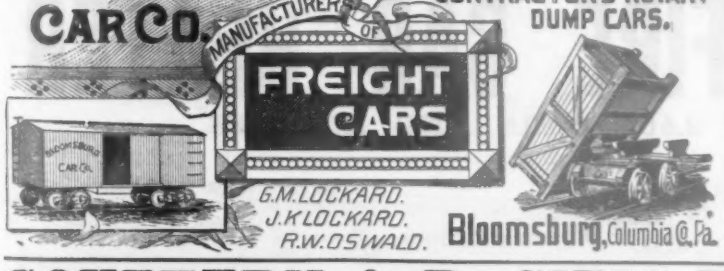

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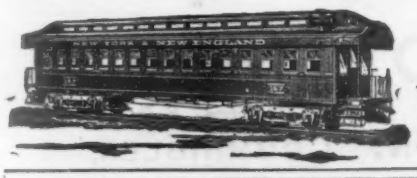

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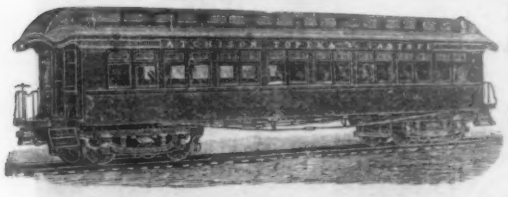

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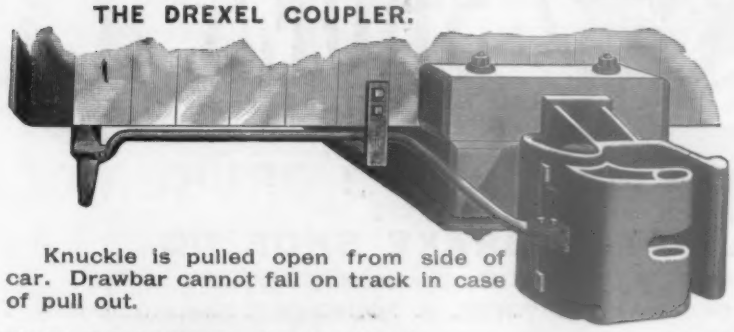

Knuckle is pulled open from side of car. Drawbar cannot fall on track in case of pull out.

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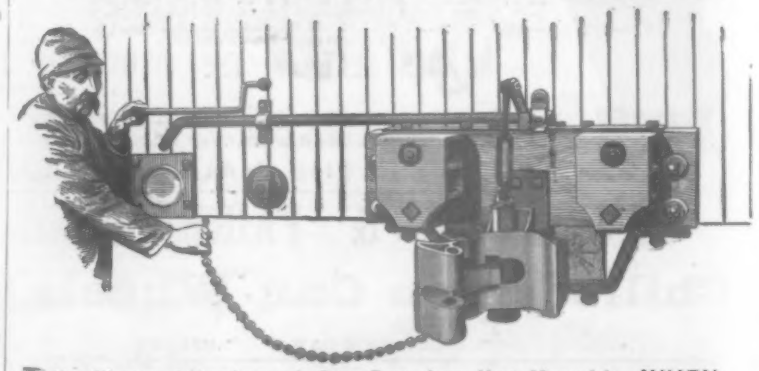

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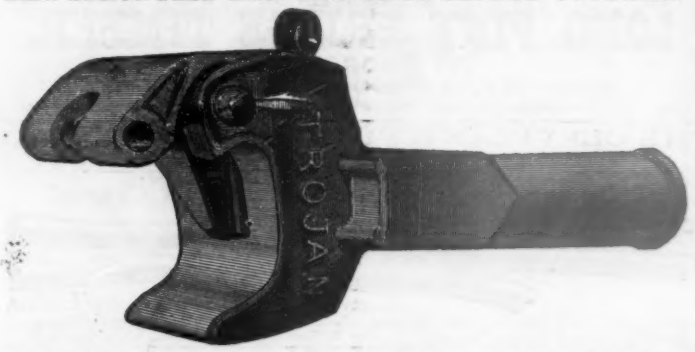

The knuckle may be thrown open for coupling by the hand-rod at the side of the car, rendering it unnecessary for trainmen to go between the cars to open the knuckle. The action is positive, and not dependent on springs or gravity.
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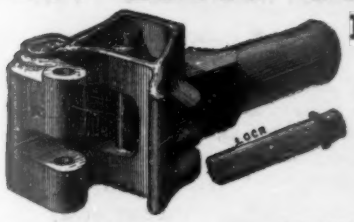

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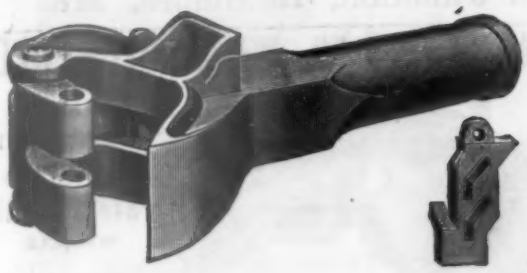

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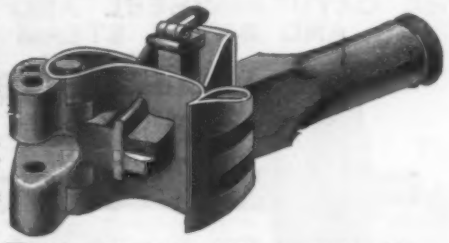

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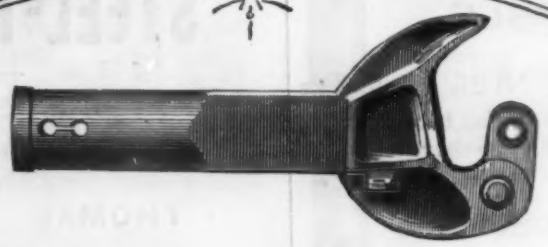

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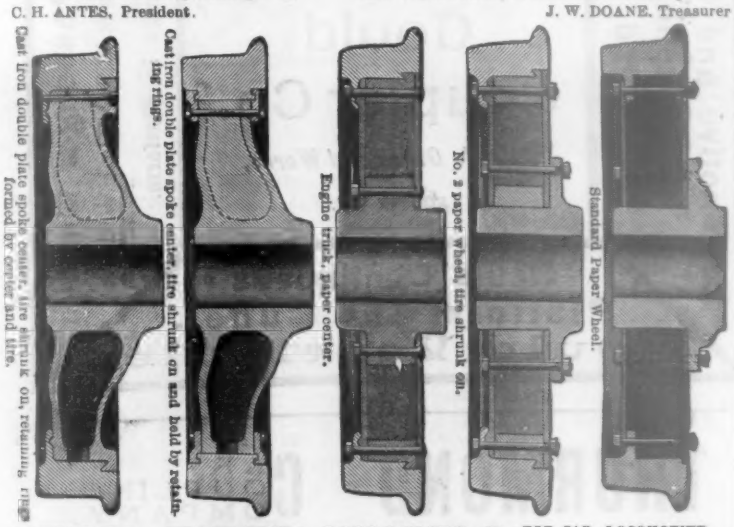
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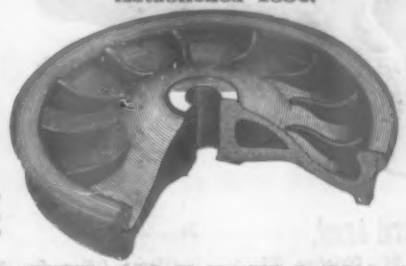

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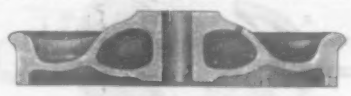

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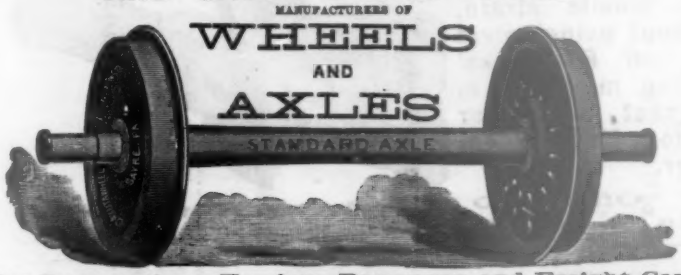

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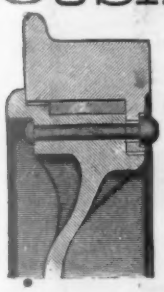

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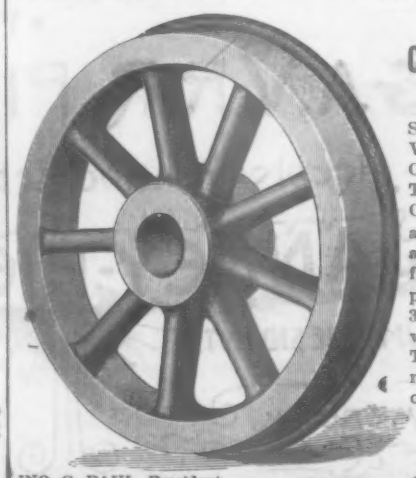

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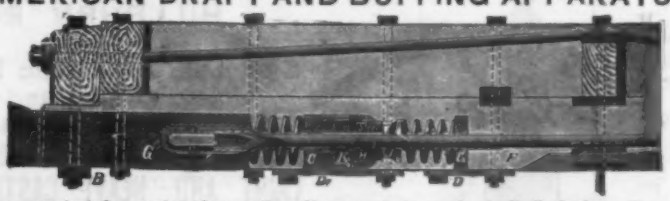

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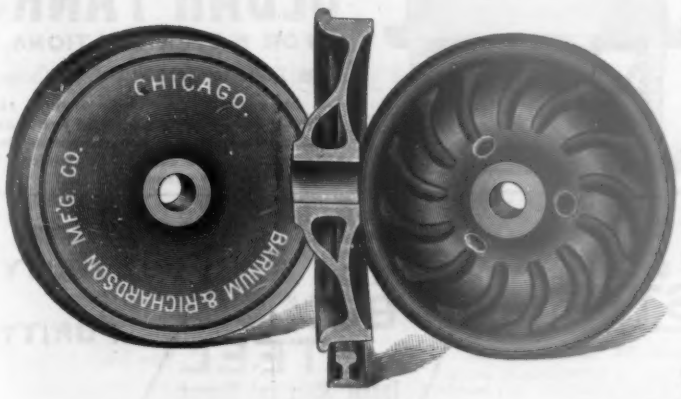

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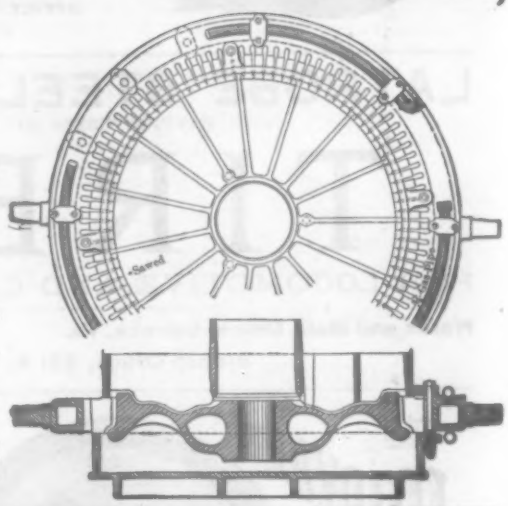

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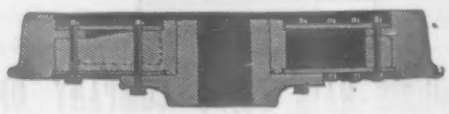

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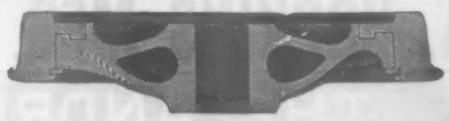

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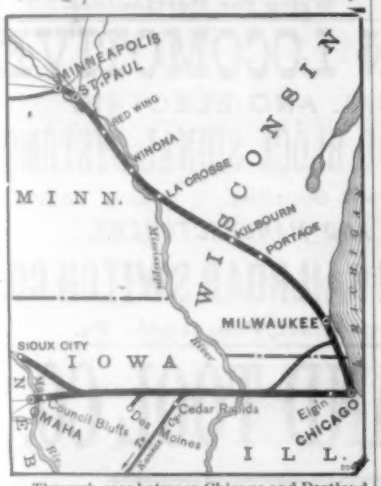

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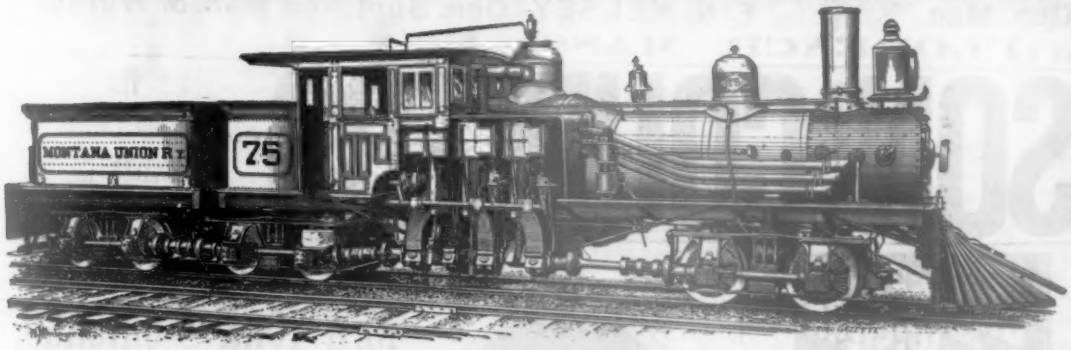

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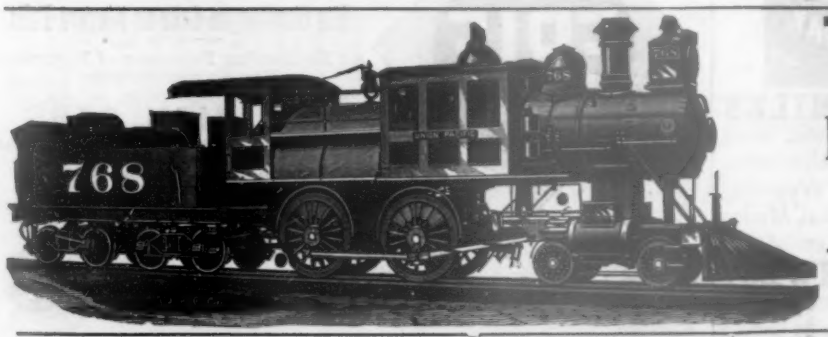

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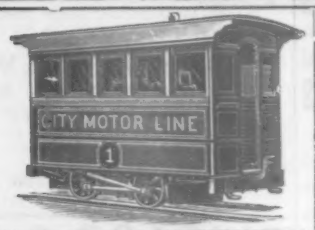

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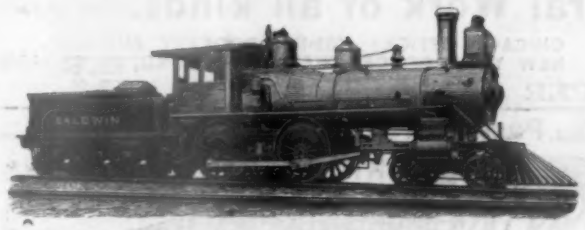

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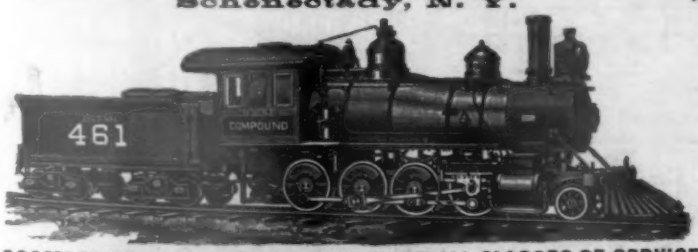

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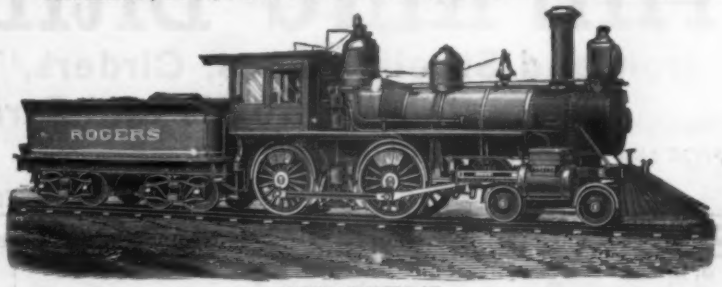

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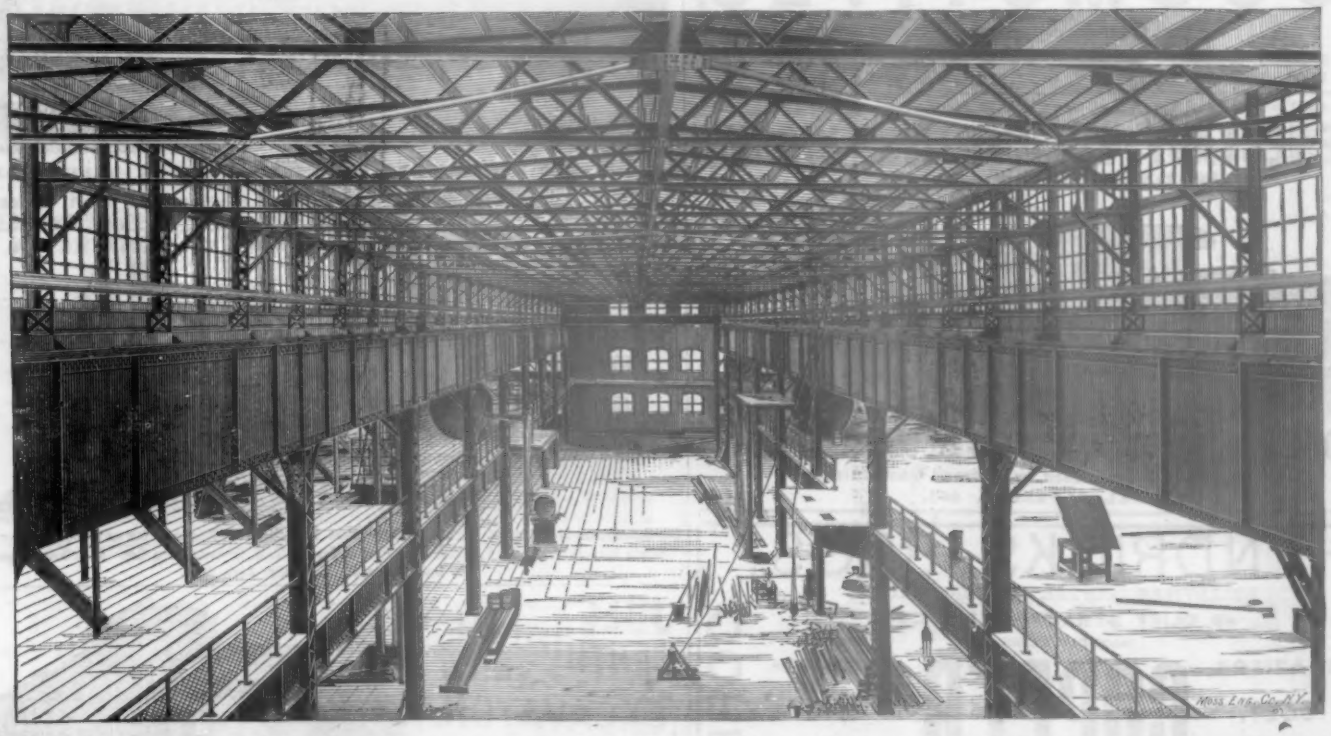

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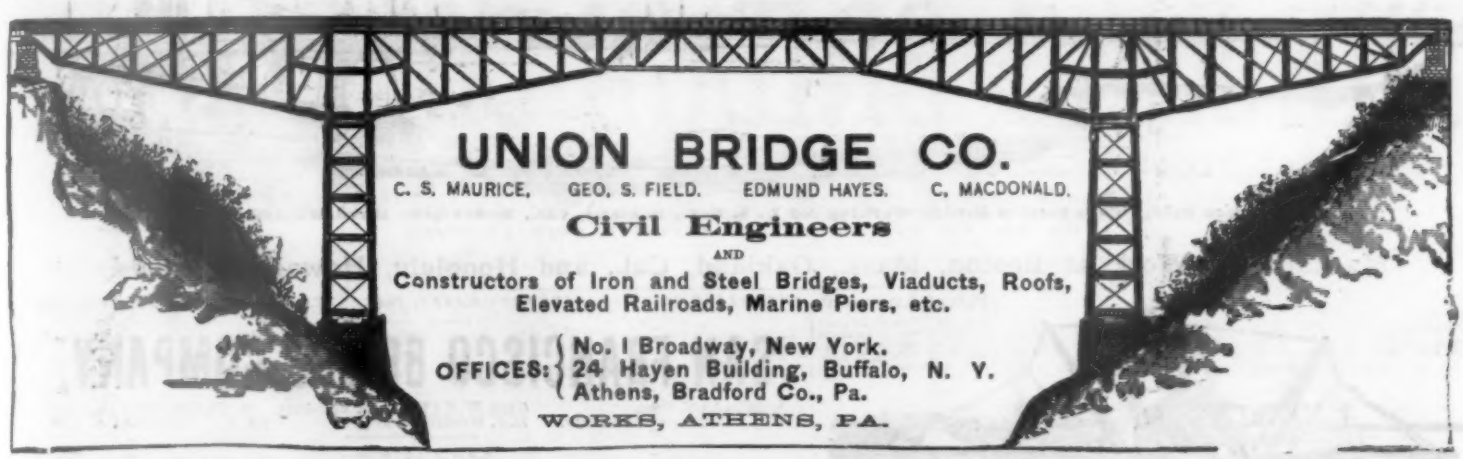

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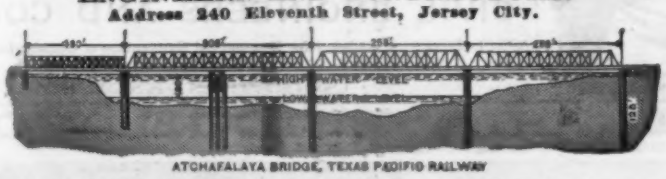

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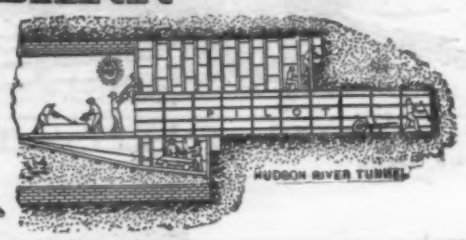

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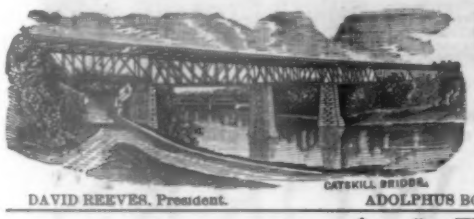

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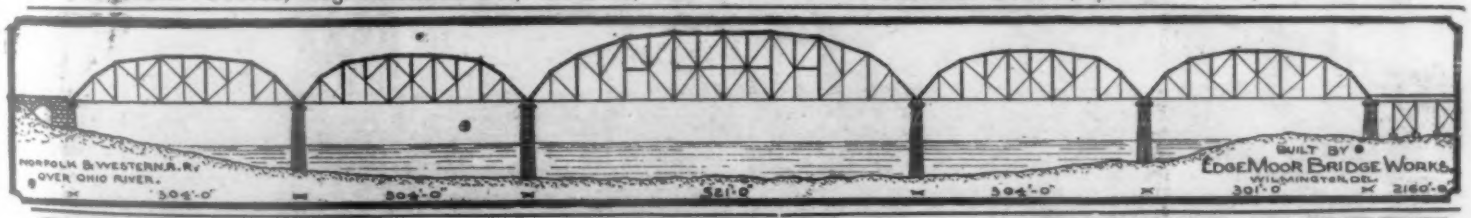

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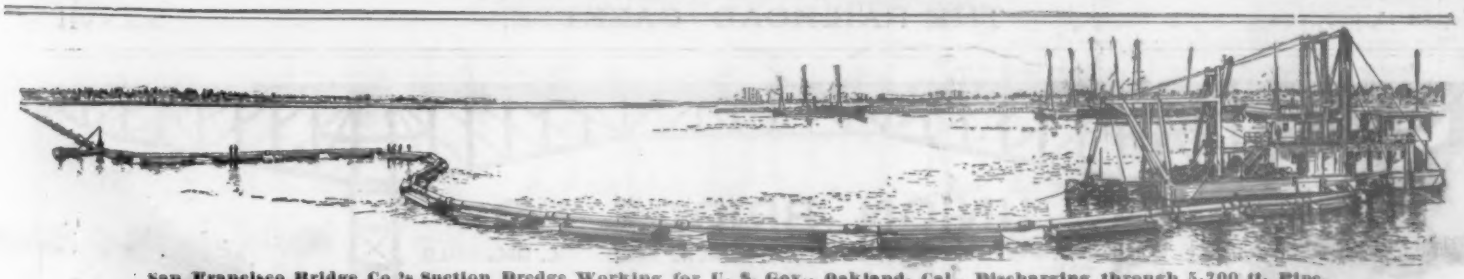

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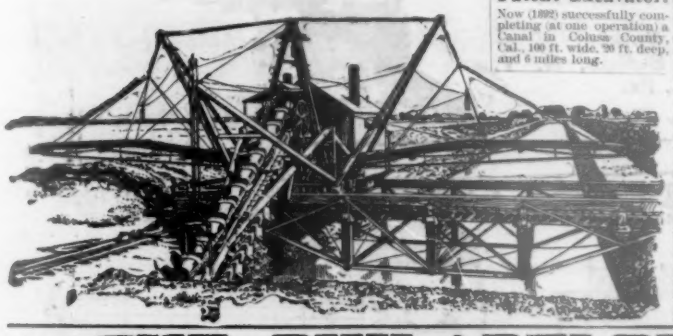

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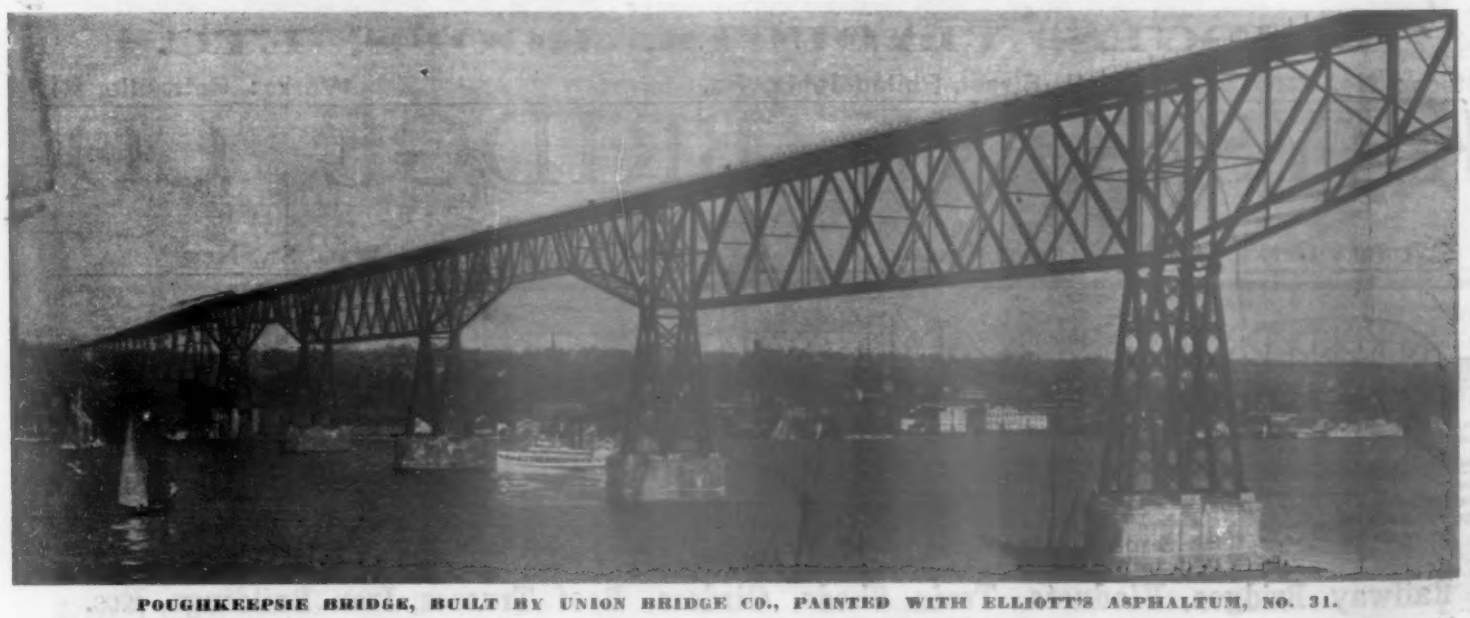

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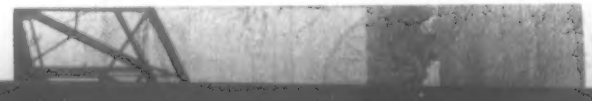

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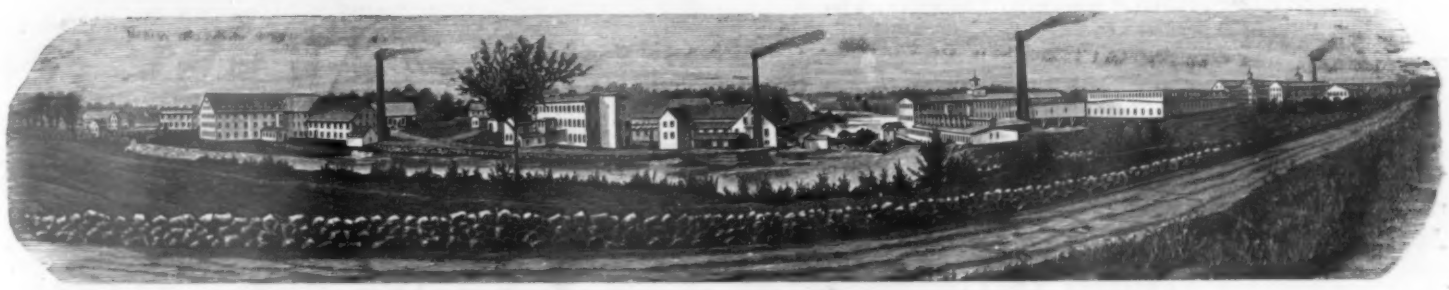

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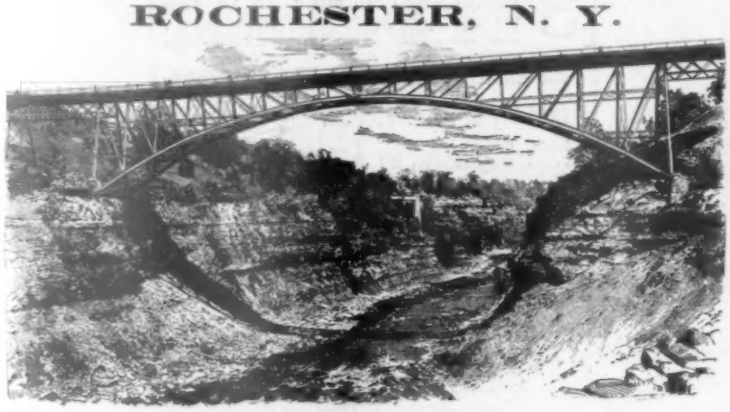

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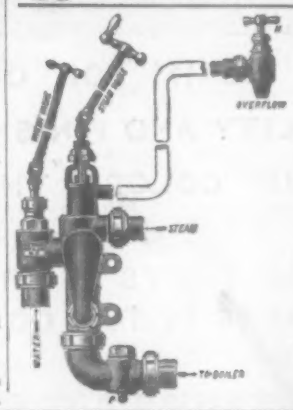

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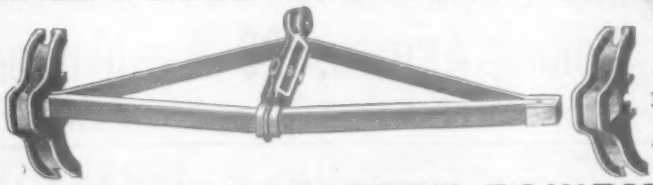
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